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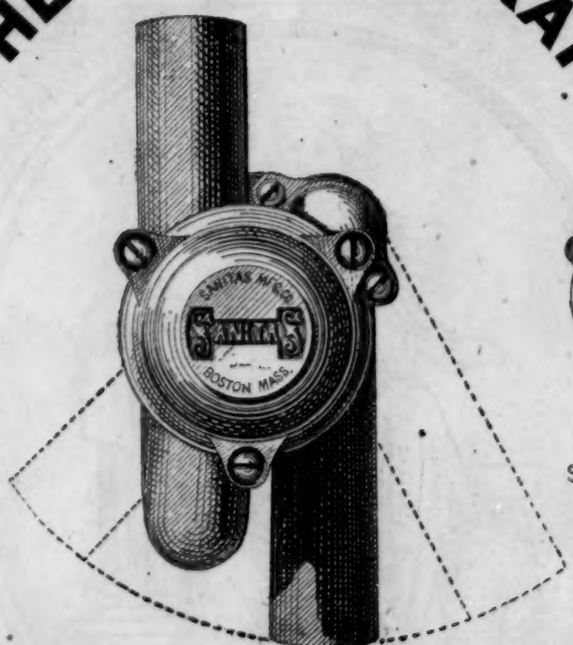

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THE recent great fire in Boston has given us some instructive lessons in the art of building. The structures burned were almost all new, and were supposed to be much superior in fire-resisting qualities to the older warehouses in the city. All of them had thick walls, and some were further protected, as was supposed, by having thick plank floors. The Ames Building, in particular, a very costly structure, was considered an excellent example of the "slow-burning" method of construction, being built with very heavy and solid walls of brick and sandstone, with floors of thick plank, supported by heavy hard-pine girders, instead of floor-beams of the ordinary kind, yet within an hour and a half from the time it took fire, notwithstanding all the efforts of an army of firemen and a score of engines, nothing was left of it but the picturesque ruins of the first story walls, and a heap of rubbish in the cellar. The fate of other buildings of similar character pointed to the same conclusion, that wooden girders and plank floors, however thick and heavy they may be, cannot be relied upon to resist for any considerable time the heat from great masses of inflammable material burning beneath them. We know, from what has been observed within the past few years, that a great conflagration is accompanied by a blast of air so hot that brick walls melt before it, and the massive timbers of the Boston stores seem to have been dissipated, rather than burnt in the ordinary way. Whether any of the buildings destroyed had their plank floors protected by wire-lath and plaster we do not know. If not, we have still a lesson to learn as to the behavior of floors so protected under similar circumstances. Another system, which has been adopted in Boston since these buildings were erected, that of placing asbestos paper between the boards of double flooring, yet remains to be tested in a serious conflagration. On a small scale, its use, which is now required by law in Boston, unless the floors are deafened with plaster, appears advantageous; whether it would be equally so on a large scale, no one can yet say.

THE cause of the fire is now supposed to have been the falling of an electric-light wire upon a wire belonging to a system used for transmitting electric-clock signals. Clocks of this sort are rather extensively used in the district where the fire occurred, and it is said that, shortly before the fire broke out, several of the dials in neighboring buildings took fire simultaneously, after the fashion so familiar where telephone lines are crossed with electric-light wires, so that there is certainly a strong probability that some of the dials in the first building burned, which is known to have been fitted with them, took fire in the same manner, and the rooms being deserted by reason of the holiday, burned until they dropped blazing among the inflammable goods beneath them. The very efficient Fire Marshal of Boston is now investigating the causes of the conflagration, and if the disaster is definitely traced to a particular electric-light wire out of its proper place, it will be interesting to learn whether the company owning the wire is not legally liable for the damage occasioned by its erratic property. The profits of the electric-lighting business are now so great, and the capital represented in it so enormous, that it is time to hold it to some accountability for carrying it on with a proper regard for other people's safety. There is in Massachusetts a special statute, providing that railway companies shall pay all damages occasioned by fires kindled by sparks from their locomotives. Under this statute the Fitchburg Railroad Company has just paid two hundred and fifty thousand dollars to make good the loss caused by one of its erratic sparks, and, in default of any better way, the statute might be extended, so as to make electric-light companies, which have far more control over their incendiary currents than railway companies have over sparks from their locomotive smoke-stacks, similarly responsible.

THE profession is certainly to be congratulated upon the results of the Cincinnati Convention. Although it does not appear, from the bare reports, that a great deal was accomplished; the most important, and most delicate business of all, the placing of the affairs of the Institute in able, conscientious and efficient hands, was executed in an admirable manner. Concerning the President, we could say nothing which would add to the veneration and affection with which that noble old artist, Mr. Richard M. Hunt, is universally regarded by his brother architects, and it is hardly more necessary to speak of the respect and regard which Mr. John W. Root, the new Secretary, has won in the profession throughout the country, not less by his ability as an artist than by his unselfish enthusiasm and devotion to the interests of architects generally. The names of the other officers of the new Institute, which we need not mention particularly, are all familiar to our readers as representing the most eminent talent, and the most distinguished prudence and business ability, among the older, the middle-aged and the younger members of the profession. Such men as the Convention has chosen do not carry out a trust of that sort by doing nothing; and what they do is sure to be well done. There is enough for them to do, and it should be our part now to strengthen their hands by doing our utmost to increase the membership of the Institute. Every new recruit of good character now will help all the rest, and there is no reason why, a year from now, there should be a single skilful and honorable architect in the United States or Canada outside the Institute ranks. There would not be one outside those ranks if it could be clearly shown how great were the advantages of being within them, and every addition in the membership makes it more desirable for the rest of the profession to come in.

AN artistic event of very considerable importance is the completion of the Bennington Battle Monument in Vermont. It will be remembered that the subject of marking all the principal battle-fields of the Revolution has been a good deal agitated of late, both in and out of Congress, and there is no doubt that before long all the most important landmarks of our early history will be consecrated in some such way as that at Bennington. We have often referred to the Bennington Monument, the design, somewhat modified, of Mr. Rinn, of Boston, and hope to illustrate it in a worthy manner when the staging which now hides it shall have been removed.

MR. JOHN BEVERLEY ROBINSON, the popular ex-President of the New York Architectural League, is a man who has decided opinions on various subjects, and is not afraid to mention them. Just now the New York Building-laws are in process of revision, and a committee of the League, with the help of Mr. D'Oench, now one of its members, and recently the Chief Inspector of Buildings of New York, has been doing some very useful work by carefully considering them, clause by clause, and proposing amendments to what is already by far the best building code in this country, if not in the world. A few days ago, at a meeting of the official Committee on Revision, Mr. D'Oench presented the suggestions of the committee of the League, and afterwards, as in duty bound, read a

report, presented by a minority of one, consisting in the abovementioned Mr. John Beverley Robinson, who did not concur with his associates in their proposed modifications, but proposed to amend the statute as the little boy improved his cat, by trimming off its tail just behind the ears. In his opinion, "all building laws" were "an abridgment of the liberty of the citizen," and he regarded it as "the duty of an architect to evade the law on every possible occasion in the interests of his client." Considering the severe penalties which the law imposes on those who evade it, there may be a doubt how far a client's interests are served by exposing him to them, and we are sure that Mr. Robinson's kind heart will acknowledge that the liberty of citizens is quite as much imperilled by offering them houses to live in which are liable, through the greed and carelessness of the owners, to burn up and roast them all alive at any moment, as by compelling the owners to furnish fire-escapes; but it is certain that architects in the large cities are often irritated by the narrow limitations to which the law confines them, and it is to be hoped that some time a way may be found for allowing greater freedom to professional men who can be relied upon not to abuse it.

SOME extraordinary experiments have recently been made by MM. Joubert and de Neuville in France, from which it appears that the vibrations of the luminiferous ether, or whatever else may be the molecular movements by which electric currents are made manifest to our senses, are capable of exciting what seem to be sympathetic vibrations in neighboring objects, exactly as in the case of the slower and coarser atmospheric vibrations caused by sound. It is well-known that large elastic objects have a note of their own, and will respond, sometimes very vigorously, to a musical instrument giving a sound in harmony with it; so that a tumbler on a table may easily be broken, by the violence of its own vibrations, if a violin near by is made to produce the note with which it is in sympathy; while bridges are often so dangerously shaken by their efforts to respond to a musical sound, or even to any measured impulse, that it is usual, in marching troops over them, to have the men break ranks and walk irregularly, and, on many bridges, band-playing or other music is expressly prohibited. To produce the corresponding electrical phenomena, it is necessary to arrange a conductor so as to receive impulses with extreme rapidity, the period of each impulse not exceeding a few billionths of a second. This is done by cutting in two in the middle a conductor of the form sometimes used for the prime conductor of a friction electrical machine, consisting of a straight bar with a ball at each end. The two portions of the conductor are slightly separated, and the cut ends are furnished with little balls, which are set at a distance of a few millimetres from each other. The other ends of the conductor are then connected with the poles of a Ruhmkorff coil, and sparks begin to pour in streams between the small balls. Many trials are usually necessary before the exact rapidity of movement required is found. Much depends upon the size of the coil, the distance of the small balls, and even on their degree of polish, since a rough surface gives a much less positive spark than a perfectly smooth one, and, for some strange reason, a strong violet light stops the vibrations immediately. When, however, all the conditions are favorable, and the electric note, so to speak, has been found to which neighboring objects are attuned, every metallic object, large or small, in the room or out of it, for a considerable distance on all sides, will give out sparks. If a piece of wire within the magic influence is bent nearly into a circle, a stream of sparks will appear between its ends; two bits of metal, placed near together, will exchange sparks, and the gas and water pipes yield similar ones whenever touched with a conductor. The effect diminishes as the distance from the exciting agent increases, but is still perceptible a hundred feet or more away, and, curiously enough, the interposition of a wall has no effect whatever, masonry being, apparently, as pervious to the electrical vibrations as a net would be to sound. From a metallic surface, however, the vibrations are reflected, and phenomena similar to the interference, reflection and refraction of light can be produced with the electrical vibrations by similar means.

THE story of the purchase of Millet's "Angelus" at the Secretan sale in Paris is familiar to most of our readers, but this heroic struggle between the American Art Association and the representatives of the French Government was not the only interesting circumstance connected with the sale. M. Secretan had spent two million dollars on his pictures and bric-à-brac, and there were a good many valuable things besides the "Angelus" in the collection. Among other matters was a picture by Meissonier, about the size of a silver dollar, painted on a wager, in a few hours. This curiosity, for it could hardly be called a work of art, brought at the sale more than four thousand dollars. Three other Meissonier pictures were sold on the first day, but only one, the "Chess-players," brought as much as the little "Five-franc-piece," one, a sketch in India ink and body-color of a "Mounted Trumpeter," selling for only thirteen hundred dollars. On the second day another Meissonier, the famous "Cuirassiers," was sold, bringing thirty-eight thousand dollars. Aside from the Meissoniers and Millets, the prices realized do not seem to have been extremely high. Delacroix's "Return of Columbus," which was sold a few years ago for sixteen thousand dollars, brought now only seventy-two hundred, and two Fromentins, the "Arab Children" and "Arab Horsemen," sold respectively for four thousand and twenty-seven hundred.

THE surplus profits of the Paris Exposition, after paying all expenses, are officially stated to amount to sixteen hundred thousand dollars, which will be equally divided between the State and the City of Paris. The subscribers to the guaranty fund, who showed great public spirit and patriotism when the success of the affair was in doubt, will not be called upon at all, and it is to be hoped that some of them, at least, will indirectly have gained by the exhibition. The receipts during the last Exposition in Paris, if we are not mistaken, were less than the outlay, but it was estimated that the State more than made good its contribution to make up the deficit, by the increased sale of postage-stamps to strangers and others interested in the show, while the City of Paris gained by the *octroi* duties on the provisions brought in to feed the visitors, as well as in other ways, more than enough to cover its expenditure on the affair. It is intended for the present to let the buildings on the Champ de Mars remain. The Eiffel Tower, under the contract with M. Eiffel, is to hold its place for twenty years, and the Machinery Hall has already been bespoken by the State for a riding-school for cavalry, while the Palace of Liberal Arts is to be used for a Museum of Decorative Art; and the other large buildings are likely to be wanted for something.

THE Germans, who chose, for political reasons, not to take part officially in the Paris Exposition, have been getting up a portable exhibition of their own, in the shape of a steamship, or, as we suppose some irreverent persons would call it, a floating peddler's wagon, containing various pavilions and compartments, in which are to be shown the wonders of Teutonic manufacture. This movable exhibition is to be prepared at the expense of a number of manufacturers, at the instigation of the Deutsche Exportverein, and the plans have already been completed. The ship itself is to be the largest afloat, measuring five hundred and sixty feet in length, and sixty-nine in breadth, and, besides the samples furnished by its owners, will carry passengers. It is intended to send the affair periodically around the world, taking two years for the trip, which will be interrupted by halts, varying in length from three to fourteen days, at the principal ports. If desired, exhibitors can send representatives in the ship, who will display samples, and take orders for goods.

SIR EDWIN CHADWICK delivered an address recently, before the Sanitary Institute of Great Britain, which contains several interesting suggestions. In general, he agrees with Dr. Richardson in thinking that "cleanliness, practised in its entirety, would banish all disease from the world," but he believes that mankind has another enemy besides dirt, in the shape of dampness, which will destroy even clean people if it gets a fair chance at them. In illustration of this, he quotes again from Dr. Richardson, who says that in a row of twenty new houses in suburban London, which were occupied so soon after completion that the condensed moisture stood on the walls and mirrors, he was called to two fatal cases of consumption in one family, while, within two years after the houses were finished, there were six more cases of consumption in them and fourteen of acute rheumatic fever, and comments upon this by saying that in new settlements, upon undrained land, one-half of all the children die before they are six years old, while experience has shown that the simple subsoil drainage of the land reduces by one-half the annual death-rate from consumption of the drained district.

THE AMERICAN SCHOOL AT ATHENS, AND DELPHI.

A FOUNDATION FOR THE ENCOURAGEMENT OF STUDY AND EXCAVATION ON CLASSIC GROUND.

Belfry at Ghent. From *Architektonische Rundschau.*

THE American School was not the first foreign foundation for the promotion of higher learning to be established in Greece. It was preceded by the well-known French School, instituted in 1846, and by the German Archæological Institute, opened only in 1874, but having already a most creditable record, not only for the advancement of literary work, but as a centre from which a new light has been shed upon the methods and achievements of Greek architecture. It was the excellent original work of these two schools, and, above all, their evident vivifying influence in France and in Germany upon every ramification of the study of Greek antiquity, which led the Archæological Institute of America, under the enlightened guidance of Charles Eliot Norton, to open in Athens, in 1882, the American School of Classical Studies.

The aims and immediate hopes of the founders of our School were modest. The first American exploring expedition upon Classic soil — that to Assos — was still at work; and while the successes achieved there were of a character to change the doubting hopes of the promoters of that expedition to pride, and to give America a place in the honorable annals of the history of Greek architecture and civic institutions, it was not expected that the new American School could become at once, like its French and German predecessors with their prestige of high achievement and of Government support, a centre of advanced original research.

The results have shown that the founders of the American School were unduly modest. In its seven years of existence, despite the inherent difficulties of cramped resources and the ensuing imperfection of organization, the American School has done work which has won for it the respect of the learned world. Dr. Sterrett's arduous explorations in Asia Minor have enriched the formerly scant geography and epigraphy of a wide region; at Thoricus and at Sicyon, our School has made valuable contributions to knowledge of Hellenic theatre structures; at Icaria, in Attica, Professor Merriam in a brilliant campaign two years ago, restored to the world the cradle of the Dionysiac cult and of the drama — the birthplace of Attic comedy and tragedy, from which the theatres of all the world have sprung. Ground has been broken, too, on other Classic sites, as Anthedon and Thisbe, in Bœotia, and at heroic and martyred Platæa, where there is promise of fruitful historic and architectural gains during the present season. And the chance is now open to our School, provided it can secure the necessary money, to excavate the almost virgin soil of Delphi — a site more rich in glorious associations and in promise of material results, than has been or is any other in the ancient world, with the sole exceptions of Athens herself and of Olympia. Of this, more below.

A brief statement will be appropriate here of the organization of the American School, and of the opportunities it offers. The School occupies, since 1888, its own building, of which we print plans and perspective in this issue. The building was designed by Mr. William R. Ware in most harmonious lines and proportions, and with the modest simplicity of decoration fitting in the presence of the unapproachable monuments of the Acropolis. The construction cost upwards of $30,000, and is entirely paid for. Within, the building is thoroughly adapted to its purposes. It contains the library, the usual place of assembly for the School, a beautiful, light room about thirty feet square, and beneath this a number of rooms for students, and in the basement conveniences for photographic work. Independent of the library wing is the main building, about fifty feet square, with a fine entrance-hall and monumental staircase, the large drawing-room and the study, and an ample suite of living-rooms for the Director of the School. In the upper story there are two open loggias for summer and winter use, and the flat roof, fitted for awnings, affords upon occasion a delightful place for enjoying the view and air. In the effort to make this building a credit to American architecture, many well-known American makers and designers took the most lively and liberal interest. Thus, Messrs. J. B. & J. M. Cornell presented the iron staircase, extending from cellar to roof; the Hopkins & Dickinson Manufacturing Company gave all the hardware required for the building; the Sanitas Company gave plumbing-fittings; Messrs. A. H. Davenport & Company and Messrs. Norcross Brothers, handsome mantelpieces for the library and the dining-room, respectively; the Belcher Mosaic Glass Company and Mr. W. J. McPherson, decorative panels for the outer door, and a beautiful window for the staircase; Mr. E. H. Kendall, a mantelpiece for another room. Other friends of the School have made other useful gifts; one gentleman provided for the fitting of outside shutters to all the windows, and Professor Farnum gave a generous sum for grading and enclosing the School's land. This land, of about an acre and a half in area, on high and healthy ground on the slope of Mount Lycabettus, commands an extensive and beautiful prospect over mountain and sea — from Hymettus over the Ægean, with Ægina and the mountains of Argolis, and the Saronic Gulf, to Salamis. The Acropolis stands out boldly in the middle ground. The land is a most munificent gift from the Greek Government, and adjoins the plot similarly given to the British School, which has been founded in part owing to our example, and with which our School enjoys the most friendly relations.

There is gathered in the School library, for the convenience of our students, a collection of books numbering already over two thousand, all carefully selected to meet immediate needs, and including, besides a complete set of the ancient classics, the archæological periodicals and the standard works on architecture and antiquities. It is the intention of the Managing Committee to keep this collection up to date.

Since last year the School has been placed, for a term of years, under the direction of Dr. Charles Waldstein, the brilliant New York critic of ancient art who has won for himself a high place among the instructors of English Cambridge, and whose criticisms take their rank, in Germany, beside those of the famous Brunn and Michaelis. Dr. Waldstein's enthusiasm for his work is contagious, and cannot but have the most excellent effect upon the *morale* of our students. Prior to last year, the School, from its opening, had been in the charge of a college professor, the new incumbent being sent out every year from one of the nineteen of our chief colleges which, by their coöperation and small annual contribution, have supported the School pending the collection for it of a permanent endowment-fund. Among these annual directors have served such men as Professors W. W. Goodwin and Frederic Allen, of Harvard, Lewis R. Packard and F. B. Tarbell, of Yale, Martin L. D'Ooge, of Michigan, and A. C. Merriam, of Columbia. This feature of the working together for a useful end of so many of the most prominent colleges has been one of the most valuable parts of the scheme, and while the annual change in the head of the School has been disadvantageous as militating against continuity, in other ways it has obviously been of great benefit, not only as bringing the students into relation with the best professional talent of the country, but from the inspiring effect upon the professors themselves of a year's residence in the atmosphere and amid the ever-living memorials of the race to whose achievements their life-work is devoted. The establishment of the permanent directorship removes what ground for criticism there may have been hitherto on the score of lack of consecutiveness, and the very great advantages of coöperation among the colleges are still to be retained by sending out each year from among their professors an Annual Director to work with the titular Director in the conduct of the School.

The School has had already the services of eight professors as annual Directors, who now, in six colleges scattered from Michigan to Massachusetts, are conducting their classical courses with increased fruitfulness, since the unescapable spell wrought by a prolonged stay in Athens has deepened and broadened the understanding of even the most accomplished. The School has sent out, up to now, thirty-three students, of whom twenty-four are now consciously or unconsciously sowing broadcast the seeds of the true Hellenic culture in the minds of our American youth, as tutors, instructors, or professors in colleges, or as principals or teachers in schools, from Massachusetts to Dakota and from Maine to Texas. Thus is being fulfilled with an efficacy almost unhoped for at so early a day the most useful end of such a school — the dissemination in our new civilization, the implanting in the minds of hundreds of young Americans in East and West, in North and South, of the rich intellectual leaven of Greece — of the cult of all that is eternally wise and true and beautiful, as distinguished from the local and ephemeral. Four others of our students are still studying with a view to becoming instructors. Another is a practising architect, — for the American School is open freely to all who are prepared to profit by its advantages, whether they are Classical scholars, or architects, or artists.

The School still lacks about half of the fund of $100,000 fixed as the necessary minimum for its permanent endowment. When this has been secured, the larger and assured income will make it possible to extend its activity in many ways. Though much has been accomplished, the managers of the School are anxious to do more as soon as they are enabled so to do by more liberal resources.

A word has been said above of the opportunity to excavate Delphi, now offered to the American School by the Greek Government. To allay any possible misapprehension on the ground of a prior claim of France to the honor of this work, it is proper to say that the Americans have respected the French claim fully, and have done nothing to obtain the concession for themselves until, owing to a political disagreement between the governments, France had lost all chance of securing it. France is now, through no fault of ours, out of the race. An unparalleled opportunity is open to us, under an official offer made by Greece, if we can secure by the end of December the $80,000 estimated necessary for the expropriation of the village of Castri, which now covers the centre of the ancient site. Of this sum, about a quarter is now at hand; Chicago and Boston have practically pledged each about another quarter, provided the remainder is obtained. It is looked to New York to furnish the balance; and if New York or citizens elsewhere will raise in time the moderate sum still lacking, America will have the credit of undertaking the greatest archæological work still remaining undone. That the French would have done this work admirably well there can be no sort of doubt. It will be our pride to show the world that America is prepared to carry through with equal honor a task of such magnitude.

With the story of Delphi all are familiar. From the earliest sure ground of history, its sanctuary of Apollo was revered by the ancients as the central point of the world. The inspiration of the Muses hovers around the holy waters of its Castalian fountain. In its Amphictyonic Confederation, the independent States of Greece came nearest to constituting a united nation; it formed for many purposes a federated republic. For century after century its prophetic oracle of Apollo was the most venerated religious seat of civilization, and the enormous influence of this oracle was exerted, with only minor deviations, to guide men and States in the paths of justice, and moderation, and enlightenment. Delphi naturally became a notable centre of monuments of architecture and art. Besides its great Doric temple of the Pythian Apollo, with the severe and majestic forms of the closing archaic period, inscribed with the precepts of the seven sages, bearing on its architrave the Persian shields from Marathon, and enriched with all that the sculptor and the painter of the noblest period of Greek art could give, there were stately temples of Athena, of Gaia, the Earth Mother, of Bacchus, of Aphrodite and many others, besides countless minor shrines: there was the Lesche, or public hall for assembly, painted with scenes from Homer by Polygnotus; there were the senate-houses of the Amphictyons and the Delphians, besides theatre, stadium, gymnasium, among many such foundations; there was a long series of treasuries of the different Greek States, in which, as at Olympia, were collected precious offerings made to the god in gratitude for his aid in time of battle or other danger; there were stoas or public porches, such as that built by the Athenians with the booty won by their early successes in the Peloponnesian War; there was the famous golden tripod offered from the Persian spoils at Platæa, of which the mutilated bronze serpent-base still survives at Constantinople; there were memorials of Artemision and Salamis, and of those sadder triumphs of Greeks over Greeks; and everywhere there were numberless statues of gods and heroes, of athletes and private citizens, and inscriptions commemorating the deeds, public and private, of every State and city to which the Delphic name was sacred.

Delphi has been plundered again and again — by the old Greeks themselves, by the Romans, Nero alone taking away 500 statues, by the Christians, after the oracle of Apollo had become forever silent, and by barbarians. Yet, though all the precious metals and a great proportion of the most notable sculptures have certainly gone, it is sure that very much must remain,—that there await the spades of our explorers a rich store of fragments of architecture illustrating some of the most famous buildings erected throughout the development and the perfection of Greek civilization, a part, at least, of the heaviest and least easily transportable of the 3,000 statues mentioned by Pliny, a mass of inscriptions which must bring new light upon every phase of Greek history and archæology, a great accumulation of minor antiquities, buried within the precincts of the sacred enclosure itself, or beneath the surface of the series of terraces and ravines below.

Times have indeed changed since the stupendous figure of the light-god Apollo, sheeted in flashing lightnings, in defence of his chosen sanctuary whelmed the terror-stricken hordes of Gallic plunderers led by Brennus, beneath the crashing crags of Parnassus. For centuries this sacred fountain-head of literature and art, of political advance and of religious faith, has been desolate — abandoned by the stately ceremonial processions sent at intervals in pomp and pageantry, according to its power, by each confederated State, by the teeming multitude of votaries of the god of all light and enlightenment, of contestants in the famous games, of maidens dancing and singing in the choral rings of Dionysos, of simple sight-seers, who filled with life its streets and groves, and its slopes looking out over the fair expanse of the Corinthian Gulf. The site remains practically untouched since it was abandoned by antiquity. Centuries of neglect and disintegration have buried almost completely the proudest shrine of ancient Hellas, and at the same time have preserved what remnants of it may be left for the instruction of our appreciative age. The clustering houses of the modern village, with their olive-yards below, while impeding exploration, have served a good purpose by delaying it until it could be undertaken on a scale and with scientific methods adequate to the importance of the task.

The Archæological Institute of America offers to guarantee the cost of prosecuting the work of excavation during a term of years, provided the money is raised now to buy out the villagers of Castri.

It would be dishonorable to America to permit this magnificent and unique chance to slip by for lack of sufficient interest to contribute a few thousand dollars.

Thomas W. Ludlow.

THE SANITARY DISPOSITION OF THE DEAD.[1]

It is now very widely admitted that one of the most unsanitary customs which has ever been practised is that of placing dead human bodies in the ground, there to gradually decay and poison the air, the earth and the water, the three elements upon which the living subsist. Indeed, sanitary science has long proclaimed against the time-honored custom of committing the dead to Mother Earth, and leaving to unaided nature the process of resolving the complex compounds constituting the human body to their simple elements, which processes of organic decay are dangerous in the highest degree to the health and lives of the living.

Says Sir Henry Thompson: "No dead body is ever placed in the soil without polluting the earth, the air and the water above and around it." But what would he and other scientists say of the placing of three or four putrefying bodies in the same grave, covered with but two to four feet of soil, and thousands of such graves upon a few acres of ground?

Many of the old burying-grounds of Europe have received so great a number of human remains as to raise the top-soil from one to four feet above the surrounding ground. Many of such burial places have been the fruitful source of epidemics and devastating plagues, which have well-nigh depopulated the regions about them. Notable among these was the Cemetery of the Innocents, at Pari , the ground of which had been so filled with buried dead as to raise it some three feet above its normal level. The result was the breaking out of a terribly devastating plague.

Bascom relates that when the parish church in Winchinhampton, England, was rebuilt in 1843, the earth was removed to change the grade, and the superfluous black earth of the cemetery surrounding it was disposed of for manure and spread upon the adjoining fields. The result was the breaking out of an epidemic of measles, scarlet fever and various malignant skin eruptions, and the population was nearly decimated. Many similar cases are facts in local histories.

The old English burying law required that but 135 bodies should be buried in an acre, and only one body in a grave. But, in practice, that number has been exceeded ten times over; indeed, almost indefinitely. In many of the cemeteries of this country, the placing of three or four bodies in one grave, opening it again for each new-comer, is coming to be no unusual thing; warning us that some of our cemeteries are even now well on the way to those conditions which have caused such widespread horrors in other lands. Even beautiful Greenwood, now holding well on towards 300,000 putrefying human remains, is said to be guilty of this reprehensible and outrageous practice.

Recent scientific discoveries have proved that the germs of many infectious and contagious diseases retain their vitality and the power to spread the malady in the grave and in the earth surrounding it. Yellow fever, cholera, small-pox, splenic fever, scarlet fever, diphtheria and other contagious diseases can be thus communicated many years after the burial of the dead.

The outbreak of cholera at Modena, Italy, in 1828, was shown by Professor Bianchi to be due to the upturning of the ground of

[1] Extracts from an address by Dr. C. A. Harvey, of New York, before the Franklin Institute, and published in the *Journal* of the Society.

burial-grounds in which victims of the plague had been buried three hundred years before.

Dr. Freire examined some soil from a cemetery in Brazil where victims of yellow fever had been interred. Some of this earth was dried and placed in a cage containing a guinea-pig. The animal became ill, and died within five days. Upon dissection, all the tissues presented the characteristic changes which yellow fever brings about, and the brain and intestines were stained yellow by the infiltration of the coloring matter of the cryptococci.

When the *soil* is infested with bacteria or specific disease germs, mephitic gases, also, of the most poisonous character are passing through the soil and escaping into the atmosphere. Experiments prove that these gases will rise to the surface through eight or ten feet of earth, and that there is practically no limit to their power of escape. While ammonia and offensive putrid vapors are all given off from bodies decomposing in graves, carbonic acid, which makes cemetery gases so dangerous, is the largest product.

Dr. Playfair affirms that "the importation of graveyard gases entering the blood produces fever; communicated to the viscera, it gives origin to diarrhœa, and may be the cause of consumption."

Already the pernicious effects of 2,000 acres of cemetery grounds in and around Brooklyn are very manifest. The westerly winds sweep those plague-spots of corruption and bear their poisonous gases and germs of typhoid fever and diphtheria to the city of Flatbush, making that the most unhealthy community contiguous to the great metropolis, and swelling the death-rate to its present alarming proportions. This is only what exists under like conditions elsewhere. According to the report of the French Academy of Medicine, the "putrid emanations of Père Lachaise, Montmartre and Montparnasse have caused frightful diseases of the throat and lungs, to which numbers of both sexes fall victims every year." "Thus a dreadful throat disease, which baffles the skill of our most experienced medical men, and which carries off its victims in a few hours, is traced to the absorption of vitiated air into the windpipe, and has been observed to rage in those quarters situated nearest to cemeteries."

Time will not now permit me to speak of the pollution of underground water-courses by the percolation through graves in which are the oozings from coffins of decomposing bodies, thus infecting wells and streams, or of the pollution by cemetery sepage into water-sheds from which large cities draw their supplies, as the Croton watershed, in which there are said to be eighty-three cemeteries, large and small, rendering the water wholly unfit for any domestic purposes whatever. That a great sanitary reform in the disposition of the dead is a most important and urgent necessity is too evident to admit of question. Then the practical query which follows this concession is: "What shall be the *nature* of that reform, and *how* shall it be secured?" Its *nature* must be perfectly sanitary, and so appointed and employed that no contamination can occur to either air, earth or water.

Now I am aware that a considerable number are ready with the suggestion that "Cremation is such a method." But let us look at it candidly, and apart from any prejudice we may have for one particular hobby. It is the opinion of eminent jurists that, should cremation threaten to become a prevalent method of disposing of the dead, inhibitory statutes would need to be enacted because of its destruction of evidences of crime, either by poisons, malpractice, assaults or violence of any kind.

Again, suppose cremation were adopted as the prevalent method, and crematories were provided with capacity equal to the burning of all the dead, New York, with its suburbs, has about 70,000 dead bodies to dispose of annually, nearly 230 bodies daily, which, if the bodies average 100 pounds each, is equal to 7,000,000 pounds of "green" human flesh to be disposed of annually, or some 30,000 pounds daily. Burn those bodies, and the air will be filled with stenches so intolerable that the community would not be long in voting cremation an intolerable and unendurable nuisance, and anything but a sanitary method of disposing of the dead. When Abraham buried Sarah in the field of Macphelah the question of sanitation was not raised. But when, in 1843, Chadwick and his associates began in London their investigations and exposures of the very unsanitary manner in which the dead of that great metropolis were disposed of, the question of sanitation was raised in so emphatic a manner as to compel public attention and secure the enactment of statutes which provided for vastly better sanitary regulations. So, when at Washington, Pa., at Fresh Pond, L. I., or anywhere else, but three or four bodies are burned in a month, the question of the sanitary effects upon the atmosphere may be scarcely thought of. But the sanitary problem would be greatly changed were all the dead of great populous communities to be burned. Here is a practical difficulty which we have never seen discussed, and for which we know of no absolutely practical solution. That cremation, to a limited extent, and as far as it can be purely sanitary, is infinitely to be preferred to inhumation from a sanitary point-of-view, no one can deny. But there are practical obstacles, both legal and sanitary, which are very serious; and there are, also, obstacles to cremation of a sentimental character which are little, if any, less serious. This brings me to speak of a method against which lie none of the obstacles or objections which are insuperable to the other methods. I refer to a process of *desiccation* of the dead in a finely-appointed mausoleum building provided for that purpose. It is a process which is faultlessly sanitary, and, therefore, meets all the requirements in that respect that the most enthusiastic advocate for burning can demand. It provides as no other disposition of the dead has ever provided for meeting and fully gratifying that tender, loving sentiment respecting the treatment and disposition of the dead which is so universal.

The sanitary advantages and perfections of this method are secured by the application of advanced science in the use of appliances and in the manner of construction. Magnificent mausoleum buildings, much more grand and elegant than any the world has ever before seen, are provided with a large number of sepulchres, which are formed in concrete and arranged in tiers and rows, not wholly unlike the arrangement of the spaces in a safe-deposit bank. The sepulchres have one opening, which fronts a corridor, for admitting the body; and, when that is placed within, a plate-glass front is hermetically sealed into that opening, and this is again covered with a marble or metallic shutter or door and made secure.

There are conduits formed in the concrete which bring dry air into the sepulchres at one end, and others which take it out at the opposite end. The air, as it passes out, is no longer dry, but is laden with gases and moisture which it has absorbed from the bodies, and is now borne through conduits to a furnace, located in an annex, where it passes through the fire and is purified; so that no deleterious gases or offensive odors can ever escape into the atmosphere. The air which is drawn into and passes through the sepulchres is first rendered anhydrous in a large drying-room, into which it is forced, and from which it is distributed to the sepulchres, where it absorbs the moisture from the bodies in its passage.

By this process a steady current of dry air is pouring into and through the sepulchre, and doing its work most efficiently on its way. The greedy avidity with which dry air seizes and absorbs moisture is known and realized by very few. When a moderate current of dry air envelops a human body in an air-tight sepulchre, constantly drawing the moisture out of the body and bearing it away, the dry air flowing in as the moisture-charged air and gases are drawn out, the process of desiccation goes steadily on until it is finally accomplished, in from two to five months. After the work of desiccation is finished the air-conduits are closed. As dry air only can be in the sepulchre when it is closed, and as the sepulchre is hermetically sealed, and, therefore, atmospheric air cannot reach the now desiccated body, oxidation cannot be expected to ensue. There the body will repose in security and sweetness until the sounding of the resurrection trump.

The fact that by this process the moisture and gases extracted from the body are borne to the fire and cremated, and that, as the process is slow, the deleterious gases and vapors pass to the furnace in small quantities at a time, and are consumed with the utmost ease and safety, it is thus made the best *sanitary* disposition of the dead.

Again, it is claimed indisputably that bacteria, microbes and disease germs of every name live, thrive and propagate in connection with moisture; and that, deprived of moisture and subjected to dry-air conditions only, they cease to exist or are entirely innocuous. Dr. Sternberg, general director of the Hoagland Laboratory, says: "The cholera *spirillum* is destroyed in a few hours by desiccation. The typhoid *bacillus* takes a longer time, but exposure in a dry condition to oxygen is one of the most effective ways of destroying this and other pathogenic germs." So that, if all the germs of disease are not entirely borne away with the moisture and gases and consumed in the flames, and should any remain, they are destroyed quite as effectually by the dry air in the sepulchre, which is hermetically sealed; thus again rendering this a thoroughly sanitary method of disposing of the dead.

Permit me to say, in conclusion, that the plan for the desiccation of bodies in a new mausoleum provides for great economy of space in disposing of the dead, rendering one acre of ground equal to thirty-five acres for cemetery use; provides for the most respectful and kindly care for the dead for all time; for perfect security and protection for the bodies placed therein; for guarding against entombment alive; preserves the remains for future removal or for medico-legal examination; provides a home which is equal in elegance to any princely mansion of earth, and vastly more enduring, in which the dead may repose without being disturbed; and, in addition to all these other advantages, its sanitary provisions are perfect, lacking nothing; thus making it the best method for the sanitary disposition of the dead.

ZINC AND BRICKWORK. — Recent experience in Germany points to the fact that under some conditions sheet zinc, when in direct contact with brickwork, suffers from rapid corrosion. It appears that in building the Berlin City market halls some sheet-zinc work which rested upon brick walls was deeply pitted at a number of places, and particularly where the metal was in direct contact with the bricks. Chemical examination of these showed that they contain as high as 1.14 per cent of soluble salts, capable of producing the destructive effects noted, and stimulated to more energetic action by moisture. The proportion of such salts will vary with different kinds of bricks, and in some there may be nothing to induce such corrosion as that here noted. It would be an advisable, and, in the end, a cheap precaution to avoid immediate contact of sheet zinc and brickwork by inserting a layer of roofing-felt or similar material.

THE ILLUSTRATIONS

[Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.]

THE FISKE BUILDING, STATE ST., BOSTON, MASS. MESSRS. PEABODY & STEARNS, ARCHITECTS, BOSTON, MASS.

[Gelatine Print, issued only with the Imperial Edition.]

COMPETITIVE DESIGN FOR GYMNASIUM FOR BROWN UNIVERSITY, PROVIDENCE, R. I. MR. HOWARD HOPPIN, ARCHITECT, PROVIDENCE, R. I.

THESE plans were made in accordance with the following requirements:—

The building is to be of brick with either terra-cotta or stone trimmings. It is to contain a gymnasium with the usual appliances; running-track, rowing-machines, etc. It is to have two dressing-rooms with 200 lockers and room for more if necessary. Shower and sponge baths and a dry-room with four or five baths; two private rooms for the Professor; billiard-room with three tables, bowling-alleys, three if possible. Cage for baseball practice, sparring-room, a piano, water-closets, three or four rooms for repairs and supplies and for the janitor; large swimming-bath if possible. The cost was estimated as follows:—

Mason work (including drains)	$10,160.00
Carpenter work (including painting and trimming)	15,250.00
Plumbing work	2,000.00
Gynasium apparatus (including lockers)	5,000.00
Furniture	1,000.00
Grounds	500.00
	$35,910,00
Extra for additions, etc	4,090.00
Total cost	$40,000.00

THE OLD RIDER FARM. SUMMER HOME OF MR. C. A. RICH, ARCHITECT, BELLPORT, L. I.

See description elsewhere in this issue.

TWO INTERIOR VIEWS IN THE SAME.

BUILDING FOR THE AMERICAN SCHOOL AT ATHENS. PROF. W. R. WARE, ARCHITECT, NEW YORK, N. Y.

A SYSTEM OF CONCENTRATED RESIDENCE.[1]

IN 1877, I had the privilege of reading a paper before the Congress of this Association, in which I stated that I thought I had discovered the cause of what I held to be the Worst Evil of the tenement-houses of New York, Brooklyn, Jersey City, etc., *viz.*: the general prevalence in them of dark and close sleeping places, of bedrooms having no windows to the outer air.

This evil had its origin I found in the street and lot system adopted in those cities, a system which prevents the subdivision of land into small lots, because allowing of no means of access to them. While small lots, as we see in Philadelphia, allow those of small means, such as constitute the majority of heads of families, to own their own homes, the impossibility of procuring such lots in New York, for instance, leads to the building, on the large lots alone procurable, of such large houses as alone pay on such large lots, and to making such houses pay better, by letting the separate floors, or parts of floors, as tenements.

I felt that this view ought to be made known as widely as possible, so that other places might happily by such knowledge be prevented from adopting the street and lot system which, in New York, had lead to the tenement-house, and to the tenement-house's worst evil.

I believe the view then presented has gradually gained ground in New York, but I do not know of its having received attention, or influenced action, elsewhere.

At the same time that I presented this view, I also prepared a plan for avoiding the evils of dark, airless bedrooms in future tenement-houses; since tenement-houses, owing to the prevalence and extent of the existing street and lot system, would still have to be built. I pointed out that, by building tenements never more than two rooms deep, both front and back rooms would, of course, have outside light and air; while repeating such a building toward the rear of the lot, the two buildings together would make full use of all the lot, and give the same accommodation as one large building, yet that all the rooms would have the same advantage of windows to the open air.

Again, I showed that if, further, the rows of buildings thus planned were, instead of running east and west, placed running north and south, the air-spaces between them would run through from street to street, and, if the ends of those spaces were left open, would give free passage to currents of air at all seasons; and so, too, free passage, on most summer afternoons and evenings, to the delightful sea-breeze which, when not shut out, makes a home in New York often cooler at night than one in the surrounding country.

Hearing of this paper, read in 1877 before this Congress, the editors of the *American Architect and Building News* wrote to me for a copy of it for their periodical; and the substance of the paper, with some added matter, was published in the *American Architect and Building News* during the year following, in a series of articles, under the title of "Urban Housing."

Subsequently, a meeting of philanthropic persons in New York resulted in the offering of a prize for a plan for a tenement-house, which, in the judgment of this committee, might be deemed best fitted to insure an avoidance of New York tenement-house evils. But my view of the cause of New York's worst tenement-house evils had made so little impression that those interested in the matter restricted the plans allowed to enter the competition to plans confined to a single house on a single lot, such as I held to be the cause of the evil; and the result was that the plan which received the prize, though a great improvement on the majority of tenement-houses then existing, showed each tenement with one of its three rooms totally without outside air or light, and another of its three rooms only very imperfectly lighted and ventilated from a well, or small close-bottomed court; and thus this prize-plan still embodied what I had felt to be the worst evil of the New York tenement-house system, the fruit of the New York street and lot system.

However, the action of this Committee, and the difficulty of finding any one at once with the capital and the disposition to carry out a plan covering several lots, united to the counsels of a philanthropic friend, led me later to devising a plan for a single house on a single New York lot, affording the same number of tenements on a floor as the prize plan, and with the same number of rooms to each tenement, but giving to every room direct light and air by its window opening into the open air.

This plan was published in the *American Architect and Building News*, September 27, 1879.

But in order to carry out this plan, I believe I proposed an arrangement which would be a violation of another New York civic enactment—one equally well intended with the New York street and lot system, but like that, by reason of its inflexibility and its inadaptation to a variety of cases, beneficient in its intentions, but maleficient in its results. The misery and loss, and harm often resulting, and indeed more likely than not always to result, from hasty and ill-considered, and above all restrictive and inflexibly restrictive legislation, was thus brought home to me again instructively.

I felt, however, that the needs of men in general to forms of Concentrated Residence, which should afford the advantages and economy in living of a high degree of Concentration of Residence, without attendant evils, was not confined to cities suffering from hampering civic enactments like those of New York. And again, that even in New York a capitalist or a combination of capitalists, might yet be found to carry out a plan for improved tenements, requiring several lots. And this whether from philanthropic motives, or philanthropic motives combined with hope of profit, or solely from hope of profit. For I felt that the better the tenements, the better the rents, as we now see in the case of costly apartments and dwellings. Later, learning that a friend had bought, out and out, an apartment in a palace at Venice, I began to conceive of co-operative building associations which would build such improved tenements for members of the association owning separate tenements, a system which has since become common in the more costly apartment-houses. Nor did I think of New York only and its adjacent cities in this connection, but of all places now and in the future where men might want the advantage of the convenience of a high rate of Concentration of Residence combined with an absence of attendant evils.

Thus working, as constantly as new light and new solutions of difficulties presented themselves, I have evolved a system of Concentrated Residence, of which I would ask the privilege of giving on this occasion some account.

This system is equally applicable to all countries. At the same

[1] The table printed in our issue for August 10 last, was presented with this paper at the recent Convention of the American Social Science Association by its author Mr. E. T. Potter, and our readers are referred back to it.

time I have felt that buildings avoiding the special evils of New York tenement-houses, yet giving the same high rate of Concentration as they, were most needed in New York. Illustrations of the system suited to New York lots have therefore been worked out and published in the *American Architect and Building News*, October 15, 1887, and May 5, 1888.

Further, I have prepared a comparative table showing wherein this system differs from all preceding systems.

By this system I have shown can be secured in New York and other cities afflicted with the evils of the usual tenement-house system, buildings giving the same accommodations as they, yet securing direct light in every room.

CATHEDRAL FOR NEW YORK.

Belfry at Ghent. From *Architektonische Rundschau.*

THE publication of six of the competitive designs by American Architects for the great diocesan church of St. John the Divine[1] deserves something more than passing notice, and the fact that a number of British architects of repute entered the lists imparts additional interest to a project of unusual scale and magnificence. With the exception of the Memorial Church on the heights of Montmartre, no ecclesiastical edifice of like importance and of such contemplated grandeur has been projected for many generations, and if the committee in charge of this undertaking should decide upon carrying into execution any one of the more favored designs, America may boast of a structure which, in point of scale at least, will vie with the great cathedral churches of Seville, or Milan, or Cologne. Restrictions as to cost, which so seriously hamper the architect in ordinary competitions, formed no part of the instructions, and consequently many of the designs indicate a piling-up of materials, with a view to attaining tallness, neglecting the more satisfying requirements of scale or of refinement in proportion.

The ingenuity of many American architects in the designing of mercantile buildings and storehouses, and the conspicuous success which has attended some of their recent efforts to break away from the traditions that fetter the nations of the Old World, favored the supposition that, in a competition of this kind, almost untrammelled by restrictions, some new departure from the recognized rules that underlie the arrangement and design of a great diocesan church would be the immediate result. If an opinion can be formed from a study of these six published designs, it is not unreasonable to say that a great opportunity has been lost and that architectural art, as represented by these designs, will be no gainer by the erection of a monster cathedral on the outskirts of New York City. The ill-success that attended a recent and somewhat similar project for Liverpool is likely to be repeated here, and for the same reason. A competition for a costly monumental work should only be undertaken after well-matured consideration of every possible requirement, and such questions as type of building and the main points to be observed in the general planning of the structure should be determined prior to the publication of the scheme. The instructions were restrictive in many essentials where latitude should have been allowed, and undefined where a series of reasonable restrictions would have assisted rather than impeded the architect in working out his design. Whether national religious sentiment, rather than a craving for a tall cathedral by a people of everyday tall ideas, was the underlying motive in this undertaking, is open to doubt. A cathedral in the older Christian communities was of spontaneous and continuous growth down to the time of the Reformation; the form and purposes were clearly defined and adapted to each successive generation, and the style, keeping pace with those requirements, remained practically unaltered for more than four centuries. The spirit that animated these builders of cathedrals during this long period still exists. It has kept alive, markedly in this country, the love of Gothic architecture in association with Christian worship. Revolutions and political disturbances in other countries in Europe have snapped the links that bound the New World with the Old, and consequently mediæval architecture has lost its hold where it might have flourished and achieved higher ends. What is there in the United States akin to this sentiment? The earlier settlers were Puritans. The form of their sacred edifices was that of a conventicle. The purposes were for the hearing of the preachers. The style was something approaching to a modern music-hall. The form, the purposes, and the style, imported nearly three centuries ago, are still in keeping with American sentiment; and ritual, more in harmony with Puritan thought than with any of the later developments in our own country, gains rather than loses by being American and not Anglican. And here it may be observed that Gothic architecture never took root in the United States. The Old church as it is called, in the Broadway, erected some fifty years ago, has never proved a source of inspiration to American architects, and the most successful of modern churches in the States, of which Trinity Church, Boston, is a conspicuous example, have little in common, whether in respect of planning or proportions, with the churches in any country where Gothic architecture still flourishes.

A glance at the illustrations in *The American Architect* will enable any one to form an opinion whether the designers have not ignored religious requirements in the New World, by adhering too closely to the sterner rules that have hitherto governed the building of cathedrals in the Old World. It is, perhaps, fortunate that the dimensions of the site, as regards length, restricted the competitors from a direct imitation of a French or English cathedral; and it is equally unfortunate that the dimensions of the site, as regards width, have not (at least in the six designs) suggested a treatment of a totally different kind. "A nave wide as Milan, with the perfect proportions of Westminster," says one of the competitors; "Cologne with its height retained, but other dimensions adjusted to it; and, for necessary dignity in a city with immensely lofty buildings, a central spire 575 feet high is contemplated." Of course, this central spire is the key-note to the whole structure. Dry-goods stores of abnormal height, and residential flats of twelve or thirteen stories, necessitate a tall something that shall dominate the landscape and rise Eiffel-like into the sky. "The support of the upper part of the octagonal tower," says another architect, "is upon heavy girders resting upon iron columns concealed in the stonework, and is independent of the piers and arches. The use of iron, securing sound construction, with precisely the effect sought by the mediæval architects, solves the most difficult problem presented to those masters — the construction of central towers, many of which have fallen, or could never have been completed as designed." A third competitor, whose plan of basilican type is of great excellence, sensibly remarks, in defense of his scheme of arrangement, that "if the Church would go back to the mediæval in architecture, she must go back to the mediæval in life; for she must live as she builds, and build as she lives."

The demerits, as well as the merits, of these designs are well worthy of study, for they show how difficult it is for an ingenious people, desirous of freeing themselves from the fetters of tradition, to avoid seeking for inspiration, even in matters of detail, from the monuments of antiquity. — *Alex. Graham in the R. I. B. A. Journal.*

[1] *The American Architect*, 5th and 19th October, 1889.

BLACK PRINTS ON A WHITE GROUND. — It has always been the desire of engineers to obtain "black" prints from plans and drawings, in place of the present blue prints. The discovery of a new substance by a French chemist, M. Pechard, announced in *Iron*, may make such a result possible. It is a mixed acid derived from oxalic and molybdic acids, and is, therefore, termed "oxalomolybdic acid." The crystals of oxalomolybdic acid, when dry, may be preserved unchanged, either in sunshine or in the dark; but if moist they quickly become colored blue when exposed to the sun's rays. If characters be written on paper with the solution, they remain invisible in a weak light; but, when exposed to sunshine, they rapidly become visible, turning to a deeper indigo-color. It is curious that this effect only happens when the solution is spread over paper or other surfaces; for the solution itself may be kept unaltered in the bottle for any length of time, except for a trace of blue at the edge of the meniscus, where by surface action a little is spread against the interior glass walls. If a sheet of paper be immersed in a saturated solution of the acid, dried in the dark, and then exposed behind an ordinary photographic negative, a very sharp print in blue may be obtained by exposure to sunlight for about ten minutes. The color instantly disappears in contact with water; so that, if a piece of this sensitized paper be wholly exposed to sunlight, one may write in white upon the blue ground by using a pen dipped in water. If, however, the paper with its blue markings be exposed to a gentle heat for a few minutes, the blue changes to black, and the characters are then no longer destroyed by water. — *Science.*

EVAPORATION OF WATER IN TRAPS.[1]

EXPERIMENTS MADE AT THE MUSEUM OF HYGIENE, U. S. NAVY DEPARTMENT.

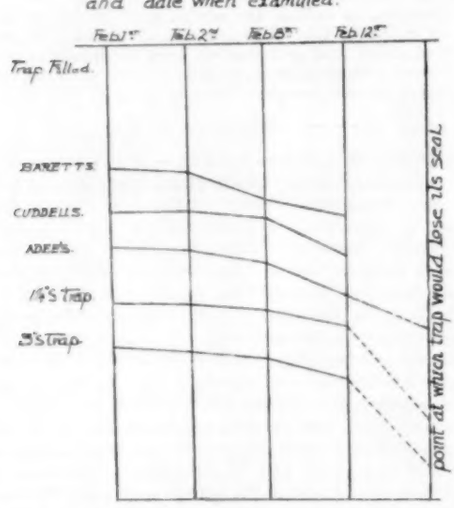
XVI Century Mantel. Hotel du Vieux Raisin, Toulouse, France.

ALTHOUGH siphonage and back-pressure are the principal causes of failure in the ordinary plumber's traps, nevertheless, water in them will evaporate and thus break their seal.

It is important to know how long they will withstand the effects of evaporation. The opponents of trap-ventilation claim that the evaporation produced by the circulation of air through the soil and vent pipes is liable to destroy the seal of traps in ordinary use. If this is a fact, it would be a serious blow to the usefulness of trap-ventilation. Mr. J. P. Putnam, some years ago, made experiments on trap-ventilation, the results of which have been extensively published. Unfortunately he made his experiment on evaporation with the same stack of pipes and carried them on at the same time that he was experimenting on trap-siphonage. Any one can see how great the opportunity was for errors and how impossible it would be for any one to judge how much of the water was taken out by siphonage and how much by evaporation.

Even when the traps were tightly plugged on the house-side, the partial vacuum on sewer-side created by a column of water passing down the pipe would cause the air between the plug and the water to expand, and who could tell the amount of water that would be forced out. And who could measure the amount of air that might pass an imperfect plug. For these reasons I consider Mr. Putnam's experiments on the subject entirely unreliable.

Some time ago I made a limited number of experiments on this subject at the Museum of Hygiene, U. S. Navy Department. These were made some time after, and entirely separate from, the



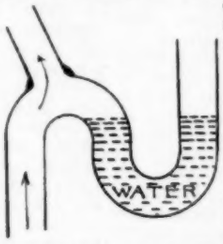
experiments which I made at the same place on trap-siphonage. Of course, the amount of water evaporated would be in proportion to the surface exposed, and the rapidity of the change of the air coming in contact with the surface. The most effective trap would be the one with the least surface and the greatest depth of seal. I experimented with five traps, Barrett's, Cudell's, Adee's, a 1¼" and a 3" S-trap, all vented. (It being assumed as a fact that a vented trap would undoubtedly evaporate more rapidly than an unvented trap.) The traps represent different areas of surface in proportion to the depth.

The small S-trap had the least area of surface and the greatest depth. To give them the severest test for evaporation, they were placed so that a strong current of heated air passed through the sewer branch of the trap and out through the vent-pipe. A stronger and more continuous current than they would ever be subjected to in an ordinary house.

The broad-surface traps lost their seal more rapidly, as was expected, than the ones with a small surface. The heighth of the water was measured at different periods, and a steady decrease was shown, being a little greater in the last four days than in the preceding six days; this was probably owing to the increased current of heated air due to a cold spell. The traps had lost the following amount of water after twelve days.

Barrett's	$\frac{1}{8}''$
Cudell's	$\frac{1}{16}''$
Adee's	$\frac{3}{4}'' - \frac{1}{32}''$
3" S	$\frac{5}{8}''$
1¼" S	$\frac{1}{4}''$

You see that the small S-trap had lost only $\frac{1}{4}''$ in twelve days, while its seal was an inch and a quarter deep. At the same rate it would have taken sixty days to break its seal with a continuous current of heated air passing through its vent-pipe to assist in changing the particles of air. I had expected under the circumstances to find the traps with their seals broken in a few days.



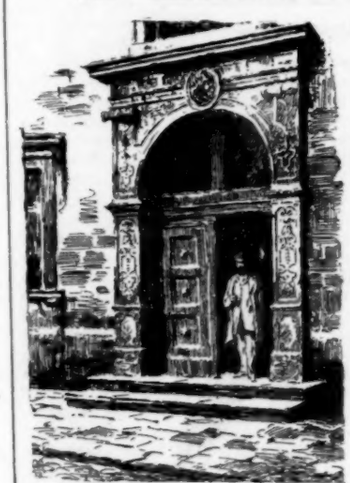
Is it not possible that there is a small column of air comparatively quiescent between the water in the trap and the current passing through the vent as shown in the sketch.

Although the examinations made of the height of water in the trap were limited in number, I think the results are ample to establish the fact that the ordinary S-trap vented will not lose its seal by evaporation for long periods, and if the traps are filled even once in two months it will be all that is necessary to keep their seal intact.

The experiments on trap-siphonage (read before the A. I. A. Convention held in New York) proved that a simple S-trap properly vented was safe from failure by trap-siphonage and back-pressure, while all traps unvented were liable to fail from either back-pressure or siphonage. These later experiments prove that the S-trap vent is safe from evaporation during long periods. I would deduce from the two sets of experiments, first: The S-trap properly vented is the best form to use. Second: No trap should be used without ventilation. I append to this paper a diagram showing graphically the rate at which the water was lowered by evaporation.

[1] A paper read at the recent Convention of the American Institute of Architects by Mr. Glenn Brown, F. A. I. A.

THE SUMMER HOME OF AN ARCHITECT.



Doorway at Dantzic. From *Architektonische Rundschau.*

WHE older a man grows the more cranky he becomes, and, if he be a professional man, he generally will hit upon some hobby or other, concerning which he will ride his neighbor to death, but at the same time get an immense amount of enjoyment for himself.

Few men ever bought a house without wanting at once to make the lath and plaster fly in some way or other, under the impression that the former resident had a terribly uncomfortable house, which it was his duty and pleasure to improve upon. Neither is an architect himself exempt from this general rule, as you shall presently see. But, outside of the house proper, almost every man wants a place of his own, which he may dub his den, his studio, his workshop or his library. It makes no difference, however, what he calls it, for in any case it is that room of rooms which a man desires to call his own, and in which he delights to spend his time in work, pleasure or study: a place wherein he can perchance throw his coat and hat wherever he pleases, and not hang it methodically upon a certain peg on the wall; where he can recline in his favorite position upon a couch of comfort, if not of great cost, and shy his cigar-ashes upon the rugs "to keep the moths out," or pull away upon his pipe without being continually cautioned not to scent up the whole house with the horrible stuff; and, joy of joys, where the dust is allowed to find a resting-place

safe from the vigorous dust-rag of every-day house-cleaning, while a very big lock with a very small key shuts out the world at will, and leaves him to the solitude of his own thoughts if he so desire.

Call it what you please, we commenced by calling ours our barn, and ended by inviting our friends to our den.

The first name was, however, more near to the truth, for it had echoed for twenty years to the sounds of man's faithful servants, and the very timbers were redolent with the odor of hay and straw.

And this is how it came about: Many years ago, while working under the direction of one of New England's most famous architects, a barn and a paint-shop were taken as a basis, moved up to one another, and by his artistic hand changed as if by magic into a thing of beauty. An old cider-mill screw formed the newel-post to a swinging stairway outside, which, by a tackle and pulley fixed in an old ship's cat-head, allowed it to be swung up at will. A balcony was formed along the side of the barn by running the roof over, and a facetious bit of legend painted on the side of the barn warned all visitors that "Those who are tall must keep near the wall."

And, if the visitor was anything of a naturalist, he observed that the balcony-rail was formed from the vertebræ of some old whale, who, after traversing unknown oceans, had become a thing of use as well as beauty by forming the balustrade thereof. And when, after passing along the balcony, and risen a few feet over the roof of the paint-shop, one passed from another balcony into the barn-loft, behold! the old side-boards were covered with paint, and the panels between the studs became pictures from the hand of the artist, and all around were sketches which delighted the eye.

I know not whether the old studio is yet in existence, but, if it is, it will still show how much of beauty can be made out of an old barn and a paint-shop, and at no great expense either.

Becoming the happy possessor of an old farm on the outside shore of Long Island, where house, barns, ice-house, milk-rooms, sheds, wood-houses, wash-houses and the inevitable hennery and piggery had for years been treated to the booming of the grand old ocean, we cast around us to see what could be done with them.

A dilapidated old horse neighed at us as we entered to make his acquaintance, and hens by the score stalked around, picking at the grain on the floor, and cocking their heads from one side to the other with the wisest of looks.

Having obtained more valuable second-story rooms by a wide gambrel in the centre of the existing long, gambrel-roofed house, we bethought ourselves of the value of the old barn, and resolved to so metamorphize it that its old possessor would never know it should he ever make us a call. Besides, we wanted a big den, and here it was, waiting for us in the rough. So it was moved up to the house, and turned, gable on, with its roof joined to that of the gambrel. One of the old hay-lofts was taken out, while the other was left to be made into a sort of gallery, opening into the second story of the house. To hold up this balcony, heavy timber-posts had been used, under which were the stalls; but, these sticks not harmonizing very well with the interior as changed, we betook ourselves to a dealer in second-hand lumber, one of those antiquarians who tear down the works of our forefathers for those who wish to replace them with the "villa" of modern times, and whose lofts are full of old columns, mantels, doors, windows, stair-posts and Heaven knows what not, of all kinds and in every condition. From him we obtained a couple of old columns of rather predominant size when reduced in height, but yet retaining their beautiful volutes and eggs and darts. These were set in place of the timbers, and a rail to the balcony formed of simple, square balusters.

To put in large mullioned windows where the huge barn-doors stood was easy, and yet the doors were left to be closed up when we left in the winter. To sheath up the side walls eight feet high, and plaster the whole roof to the ridge was also easy, and a simple stair-case of pine led to the balcony and second floor of the house, while the frieze above the sheathing up to the plaster roof was covered with jute cloth of warm tone, and held by brass tacks.

The most important feature was yet undone. A man who has not seated himself before a big old-fashioned fireplace, upon a fall or spring evening, and seen the play of the firelight, has not yet lived, and the old back-log stories are simply legends of which he knows nothing. I do not mean by this a fireplace whose opening seems to be measured by a decidedly slim purse, where small billets of wood bought of the grocer by the hundred are used, or where diminutive chunks of coal are condescendingly allowed to sizzle and snap. Nothing of the kind.

We took one-third of the whole end of the barn, and built up a big common brick fireplace opening, that allowed logs the size of a man to be rolled into it, and a visit to the village blacksmith gave us a couple of andirons which we paid for not by their skill, but by their weight. Gathering in the flue properly at the top, a large hood was built for a mantle, leaving a shelf for jugs, plaques, bric-à-brac, and also, most assuredly, a goodly quantity of dust.

Next, to light our abode became quite a formidable problem, but, having painted all the woodwork and beams throughout with white paint, another visit to the blacksmith yielded a huge iron ring about five feet across, with a heavy cannon-ball across the centre, and hung from the roof by four chains, while iron cups held the lamps. This, with the numerous candelabras around the side walls, made us a glorious illumination when required.

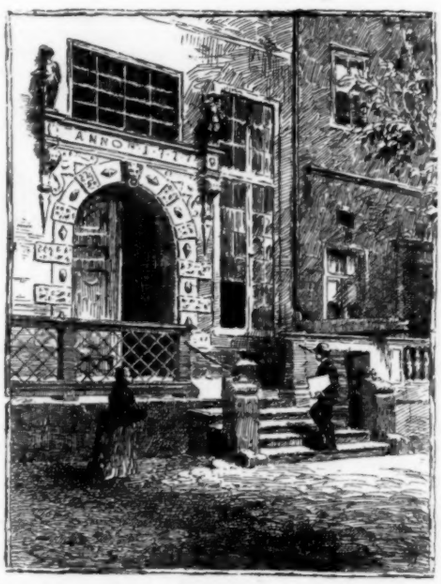
We happened one day to be riding around one of the enterprising little villages with which Long Island abounds, and going into the corner-store, which every town possesses, met some old citizens bargaining for some gorgeous Brussels carpeting which seemed to them to be the only proper covering for the best "setting-room" floor. And, as we watched, we found that they had brought with them a huge roll of that delightful old rag-carpeting, made in their homes during the winter months, and so appreciated by artists; this they were trading for the gorgeous, inlaid pattern, all wool and a yard wide, stiff-texture Brussels, and paying a bonus in money besides. Here was our chance, so without more ado we took enough for a rug fifteen by eighteen feet, and what do you suppose we paid for it? A ten-dollar note allowed us to carry it off to our den, while our benighted neighbors paid a ten-dollar note besides their rag-carpet, and took away the terrible stuff to deck the "setting-room," and, no doubt, considered us benighted city boarders.

After this we visited our old friend, the carpenter, who made a grand old table out of plank boards, neatly smoothed and painted white, and also some box seats, over which were to be thrown mattresses and rugs, and thus form divans which might tempt the very houries of a harem.

Well, the summer passed and fall set in: the great barn-doors were closed, covering up the little mullioned windows, the old charred back-log was covered with ashes, and little brown faces and sun-burned hands returned to the city. But at Thanksgiving a few hours will take them back for a day, the big barn-doors will be thrown open, the old back-log will be raked out and supplemented by blazing bits, and the chicken-coop will suffer a diminution in the number of its occupants. The long table will be covered with good things, and while old ocean pounds away on the beach with its anthem of grandeur, I cannot help feeling that the den will furnish a magnificent place to spend the day, before finally leaving it to the snow and sleet of coming winter. At any rate, our barn-house becomes a home of much comfort, where the cares of the world, the flesh and the devil, together with the fret of a busy professional life may be thrown to the winds of the Atlantic, and exchanged for the quiet and restful influences of our old den.

C. A. R.

DOMES AND TOWERS.[1]



Doorway at Dantzic. From *Architektonische Rundschau.*

WHERE are no feature of architecture so pleasing as domes and towers. However beautiful may be the porticoed entrance; however bold the projected pavilions; or however varied or extensive the façade, the eye will single out the dome or tower and with instinctive pleasure follow it up to the summit.

Though domes crown the grandest buildings in the world, I must confess that I never look on a dome with the same degree of satisfaction that I feel when looking on a tower.

No matter how much I may assume that all the necessary consideration has been bestowed on the principles governing domical construction, its theory of equilibrium and lines of gravity, yet am I unaccountably possessed of the idea that those gracefully swelling outlines cover a world of ingenious expedients to hide the actual construction of the towering mass, carrying on its interior so much sham work of lath and plaster, taking the form of antæ and entablatures, heavy groupings of pedestaled victories, and statued niches.

Of all the great domes that have been built in the past six centuries not one can compare with the first aerial dome, that of Santa Maria del Fiore at Florence, built in the twelfth century by

[1] A paper read by Mr. McNamara, at the Convention of the American Institute of Architects and the Western Association of Architects.

Brunnelleschi. In this alone do the outer and inner domes sweep upwards in parallel lines, springing from the same arched base, and are the actual supports for the beautiful lantern surmounting them. The nearest approach to the honest construction of Santa Maria is St. Peter's at Rome. That was modelled after it, in the fifteenth century, by Michael Angelo. Although its two domes do not run quite parallel, they well come under the weight of the lantern.

Both St. Paul's at London, built in the sixteenth century by Sir Christopher Wren, and the Panthéon at Paris, built in the seventeenth century by Antoine [Soufflot], have each three domes, springing from the same perpendicular base, but each sailing away in a direction for itself, looking as if each one was crowded down by the one above it. Both domes are outwardly beautiful, and interiorally false, from the fact that one of the three must be useless. Particularly does St. Paul's possess both of these features. And the St. Paul's of Paris, the Dome des Invalides, built in the sixteenth century by Mansard — the originator of the "Mansard roof," — is of the same class.

The cupola of the church of Santa Sophia at Constantinople, built by the architect Anthemius, is a beautiful link between the grand aerial domes I have mentioned, and the hemispherical dome of the original Pantheon of Rome. This latter had regular tiers of caissons from base to eye, and was the first step out of the brick vaults that covered all the circular temples of Pagan Rome.

The first known attempt at dome building was the tomb of Agamemnon at Mycenæ. It was formed by horizontal courses of large blocks of stone, each course projecting one beyond the other, as they rose toward the eye, the projecting courses being afterwards cut away to an even surface. Gwilt tells us that "it is the most ancient in Greece; and it is a curious circumstance that at Drogheda, in Ireland, there is a monument, whose form, construction and plan of entrance resemble it so closely that it is impossible to consider their similarity the result of accident." And on this Gwilt believes in the hypothesis of the distinguished archæologist, Geoffrey Higgins, "that these works were built by the same race of people, who were the earliest enlightened and learned occupiers of Greece, Italy, France, Britain and Ireland. And that the language of the whole western world was the same, having the same system of letters — that of the Irish Druid — the alphabet in which is written the Irish MSS.

There is a painful similarity in the outward appearance of all the domes of the world, for, when one is to be designed, St. Peter's or St. Paul's serves as the prototype. No matter how much talent the architect may command, his originality is ever environed by the outlines of those two domes. This is clearly illustrated in the case of Sir Christopher Wren, who displayed such wonderful resource in tower building, and yet, after three attempts at a dome, had to follow generally St. Peter's in outward form.

The use of wrought-iron in latticed truss and ribs relieves the architect of our day of much anxiety in modern domical construction. This manner of construction has been successfully used in the dome of the St. Louis court-house, which is as beautiful in outline as any of those I have mentioned. It is seventy-five feet in diameter and 185 feet high from floor to top of lantern. It is in the Grecian-Corinthian order. This dome has passed through quite a siege of talent in its struggles for completion. Originally designed by a civil engineer, it stood up to thirty-five years ago on a circular base, rising slightly above the abutting roofs of the four wings of the building. In outline and color it looked like an inverted pot. It then fell into the hands of a well-trained architect, who tore it down, and designed a dome in appearance and construction closely resembling the present one. But before the architect had time to carry out his well-matured study, through political influence, he was removed, and a "boss-carpenter" took charge of it. The boss-carpenter put aside the architect's drawings, and started out to be original, and succeeded. He began constructing the dome in sections of cast-iron, having a base two feet wide and a depth at the eye of twelve feet. When these sections began to kick out at the haunches and collapse at the eye the authorities got uneasy and called in an accomplished architect to investigate it. He was allowed to associate with him his brother architect who was superceded by the boss-carpenter, and the two architects made a thorough examination. Their calculations and geometrical drawings of the cast-iron sections revealed the fact that the lines of gravity passing from the eye of the dome through the sections, as put up, dropped eighteen inches inside of the foundations on the ground-floor. The boss-carpenter's castings, which cost $20,000, were condemned, taken down, and sold as scrap-iron. The dome was again started upwards, as designed by the first architect, and carried to completion by all succeeding architects. Standing in the centre of the dome you have a clear, uninterrupted view from the ground-floor to the ceiling of the lantern.

This dome is again the centre of a spirited controversy, over some fine wall-decorations by the late artist Wimer, the famous delineator of Indian scenes. He designed for four panels in the dome and painted in a beautiful manner four historical American scenes — "De Soto discovering the Mississippi," "Marquette descending the Mississippi," "The Attack by Indians on St. Louis," and "Buffalo on the Plains at the Foot of the Rock Mountains." Supporting these pictures he painted the heads of Washington, Lincoln, Benton and Bates. All of these, with numerous allegorial figures, are now fading and scaling off; and the vexed question now being agitated by the admirers of the great artist is how to preserve his paintings.

Quadrilateral vault domes, such as those on the United States custom-house, 230 feet high, and the "Four Courts" in St. Louis, are effective for outward appearance, but leave no room for interior decorations. That of the United States custom-house is a fine example, having a good base and a fine sweep, coming easily under the weight of the lantern. That of the "Four Courts" is not so good, being too depressed at the lantern. A novel feature of this latter design was four American eagles standing on pedestals at the base of the dome. They were of immense size and rapacious appearance, looking out on the street with outspread wings and outstretched necks, and hooked beaks wide open, as if about to swoop down on "a forgotten soldier." They are not there now. Tradition says they flew away upon hearing it proclaimed that a paltry million-dollar city-hall was to be built in the adjoining park. They, proud birds, the golden offspring of a munificent "county court," would not perch in front of this beggarly offering from the "new city charter."

There is more variety in the plans and dimensions of domes than in their appearance.

St. Peter's is square in plan, 139 feet in diameter and 450 feet high. St. Paul's is octagonal in plan, 100 feet in diameter, and 425 feet in height. The Pantheon, at Rome, is circular in plan, 140 feet in diameter, and 145 feet in height. The Panthéon, at Paris, is square in plan, 120 feet in diameter, and 340 in height. Santa Sophia, is elipitical in plan, 115 feet in diameter, and 180 feet in height. Santa Maria del Fiore is octagonal in plan, 138 feet in diameter, and 400 feet in height. The Dome des Invalides, at Paris, is 50 in diameter, and 323 feet in height. The dome on our own grand capitol, at Washington, is 125 feet in diameter, and 300 feet in height.

Towers preceded domes, as can be traced by the obelisks of Egypt, the columns of India, the Druidical pillars of Britain, and the round towers of Ireland. And there is more room for the originality of the architect in tower designing, as the multiplicity and beauty of the towers of the various nations can testify.

Passing by the monumental columns, which exhibit no originality after the orders became known, we halt before the wealth of fancy and inspiration found in the Gothic towers. These are chiefly confined to the great cathedrals, such as the twin towers of Cologne, over 500 feet high, building from the eleventh to the present century. The whole school of Gothic architecture is embraced in this structure. The single tower of Ulm, over 400 feet high, built in the fourteenth century, and the equally beautiful towers of Strasburg, whose great beauty is its deep panelling and bold sculpturing, giving it a play of light and shadow on a sunny day that charms the artist Strasburg, I believe, is the birthplace of the world's greatest artist, in light and dark, — Gustave Doré.

The towers of Nôtre Dame, at Paris, built in the tenth century, though not lofty, being but 200 feet high, are beautiful in detail. Mechlin can boast of a noble tower. But the most beautiful of all the Gothic towers is that of Nôtre Dame, at Antwerp, from whose summit can be counted over a hundred steeples, and in turn, from the sea, over a hundred miles out, can be traced this beautiful tracery in stone. And it is fitting that Rubens's masterpiece, "The Descent from the Cross," should have such a sanctuary.

Many of the civic buildings of Europe can boast of towers which are fine specimens of the Gothic, the most beautiful of which is that of the Town-hall of Brussells, some 200 feet high. This is of the florid Flemish Gothic. The fine tower of the Glasgow University Buildings, 200 feet high, by Gilbert Scott, is somewhat marred by the angle finialed turrets, making it top-heavy.

A species of tower that has a fine appearance are those that occupy the place of a dome and have a domical termination. The Town-hall of Bolton, in England, 270 feet high, is a fine example of this idea. That of the capitol at Albany, 250 feet high, is well-begun and carried up in fine proportion for three stories, but it should have a domical termination twice the height given it.

By far the finest tower-design in this country is that of the City-hall at Philadelphia. This tower is 537 feet high, being the tallest in the world, for the Washington Monument, which is thirteen feet higher, cannot be properly classed as a tower. The Philadelphia tower is not as well-begun as either the Albany or the Bolton towers. It lacks the broad rustic base and the well-defined graduations from story to story that marks the offsets of the stories in both the Albany and Bolton towers. But it rises majestically, with well-sustained variety in its face. Were the tower attached to the new Odd Fellows Building in St. Louis, 236 feet high, more pronounced by a greater projection and more liberally treated in the last story, its architect could claim for it a place in the front rank of modern American towers.

The great beauty of towers, to my mind, is to see them start squarely from the ground, having the earth for a base. Nothing so offends my eye as a tower to first make its appearance astraddle of a roof.

For these reasons the campaniles command my admiration. They belong to the church and are always found standing guard over the venerable pile lying sheltered at their base. From their lofty lanterns the great bells call the faithful to prayer and remind man of his infancy, his manhood and his declining years as its warning peals ring out the "angelus" at sunrise, at meridian and at sunset. They are nearly all in the Romanesque, that of St. Mark's being a fine specimen of the Venetian Gothic. The loftiest is that of Cremona, Italy, being 395 feet high. Next comes one in Florence,

267 feet high. The best-known and the most remarkable is the leaning tower of Pisa, in which is hung a green bell, that never tolls but on the death of a criminal.

England can present one grand example in the clock-tower of the new Houses of Parliament, 350 feet high, by Barry. And Ireland another, the Albert Memorial Tower at Belfast, 100 feet high. Barry's is purely Perpendicular Gothic and very elaborate. The Belfast Tower has the lantern Gothic, with the shaft and clock panel Romanesque. The city of St. Louis has two good examples of the campanile, that of the Central —— Church, 135 feet high. In panelled shaft and open lantern it somewhat, at a distant view, resembles St. Mark's. The other example is the new water-tower, 200 feet high, which is very creditable to the designer.

Sir Christopher Wren, who was the first architect to Classicize the Gothic, has strewn London with beautiful towers and one beautiful dome. It is most incomprehensible that the architect who designed St. Paul's could be the same architect who designed the first dome submitted by him to the royal commission — a fine apple-shaped cupola, surmounted by a six-story pagoda. And yet the number and beauty of his towers is simply marvellous. He never attempted the Gothic, yet was he very successful in his addition of the twin towers to Westminster Abbey.

St. Clement's, Dane, St. Martin's, St. James's, Garlick Hill, St. Dunstan's in the East, St. Stephen's, Walbrook, and the three beautiful towers of St. Bride's, St. Magnus's and St. Mary-le-Bow — at least half a hundred towers, spires and cupolas rise before my vision as objects rise when you move from them, composing a beautiful architectural perspective, having for its "point of picture" the great St. Paul's.

Wren's towers are towers from the ground up, invariably square and plain, until the roof line is passed. And, although the upper stories are often repeated, yet the offsets are so artistically defined, by use of the cinerary urns, pyramidal vases and other ecclesiastical emblems, that the eye is satisfactorily led up to the distant vane.

Others of the English architects, such as Barry, Sir William Chambers, Smirke, Soane, Dance and Gibbs have supplied London with towers that are fit companions for Wren's. In the Classics, Mary-le-Bow, by Sir William Chambers; St. Leonard's, Shoreditch, by the elder Dance, and St. Martin's-in-the-Fields, by Gibbs. This latter is equal to the best of Wren's, but it has the great fault of rising behind a portico and astraddle of a roof.

Innumerable towers of great beauty, surmounted by spires, familiar to all architects, I have not mentioned because my intention was to treat of the tower proper, in opposition to the dome.

SOCIETIES

THE BOSTON ARCHITECTURAL CLUB.

THE annual reports, which were presented to the Club, November 4, contain many facts which will be of interest to the architectural and artistic public. The Club began its existence, August 17, 1888, since which time a constant interest has been manifested in every department, and the results accomplished have been most encouraging in every respect. It is not, strictly speaking, a professional club, since it comprises within its membership many who are engaged in the practice of the allied arts, sculptors, glass-workers, decorators and the like, though the proportion of non-professional members is restricted by the constitution to one-quarter of the entire number. Nor is it in any sense a sketch-club, sketching and drawing classes contributing to form only a portion of the year's work. Broadly stated, the club proposes to unite all who are truly interested in the profession and practice of architecture on the common ground of love for art and a mutual desire for self-help and advancement along all the lines which distinguish mere building from what is truly architecture. The membership at present includes many of the best architects in the city as well as a large proportion of the draughtsmen, so that without any thought of establishing an arbitrary standard of artistic merit as a requirement for admission, the club can be considered as fairly representing all sides of the profession.

There are at present about 170 members. The club-rooms are open all the time, and for a club of this size, are used very freely. Originally a single floor was leased, but the necessities of the classes and other features have so increased that at present, all of two and half of a third floor give none too much room. The monthly attendance from the beginning of this year has been as follows:

January	800	June	760
February	950	July	325
March	811	August	395
April	700	September	695
May	927	October	737

The largest attendance during any one day has been 126. The largest attendance at a lecture or conversazione has been 87. The total number of visits to the club-rooms by members and others during the past ten months has been 7100, or since the club was started, nearly 10,000.

Mere numbers, however, are not a very sure index of the work which has been done. Each of the Rotch Scholars, Mr. Newton and Mr. Josselyn, has been tendered a reception on his return to this city. Public exhibitions to which all are welcome without charge, have been held from month to month, including three exhibitions of the Rotch-Scholarship work, exhibitions of plans and studies for the new Public Library, stained-glass and tiles, water-colors, and drawings and sketches by Messrs. R. C. Sturgis, Dwight Blaney, Harry Fenn, Joseph Pennell, the *American Architect* Drawing-office, and others. Lectures have been delivered before the club on the Origin of Egyptian Architecture, by Mr. George Snell; on Italy, by Mr. C. Howard Walker; France, by Mr. R. D. Andrews; England, by Mr. R. S. Peabody; Spain, by Mr. G. F. Newton; and on the Relations between Architects and Clients, by Rev. E. E. Hale, DD.; while informal *conversazioni* have been held at which were discussed the topics of rendered drawings, methods of study, the planning of large buildings on the French system, water-colors, the designing of stained-glass and tile-work, and architectural travels in Europe. This comprises what might be termed the public work of the club. The classes have been limited only by the size of the rooms at their disposal. Mr. Ross Turner, in water-colors, Mr. D. A. Gregg, in pen-and-ink work, a sketch-class from the draped figure, a life-class from the nude, and monthly competitions in design have afforded ample opportunities for those who were disposed for such work. Enlarged quarters, recently acquired by the club, will enable it to add to these for this year a class in modelling, under Mr. Andrew Garbutt, and a class specially intended to prepare the aspirants for the Rotch Travelling-Scholarship directed by Mr. W. E. Chamberlin and Mr. G. F. Newton.

The club has purchased a large stereopticon and about 400 slides illustrative of the history of architecture, besides which, collections embracing nearly 2,000 slides have been placed at its disposal. These will be used by Mr. Walker in connection with illustrated lectures during the winter. All of the best artistic periodicals are kept on file at the rooms, and the nucleus of a library is forming.

During the year two excursions were made by the club, the first to the Chelsea Tile-Works, through the courtesy of Mr. J. G. Low, and the second to Newport, where the houses of Mr. Cornelius Vanderbilt, Mr. Van Allen and others were visited under the direction of Mr. Dudley Newton.

A club which has accomplished as much as this during its first year, with a total attendance of nearly ten thousand drawn chiefly from the ranks of the busiest of professions, has certainly demonstrated its reason for being, and can fairly hope for still larger and better results during the coming year.

COMMUNICATIONS

[*The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.*]

STRAW-BOARD.

SARATOGA SPRINGS, N. Y., November 19, 1889.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Can you inform me in the columns of *The American Architect*, where I shall get heavy, say ¼″ thick, straw-board, rolled hard and smooth, 3′ 8″ wide. Perhaps it can be secured of papier-maché and if so, would be preferable to the straw-board.

Yours very respectfully, R. NEWTON BREZEE.

[WE have obtained excellent material of this nature from Charles T. Wheelock, 64 High Street, Boston. — EDS. AMERICAN ARCHITECT.]

BOOKS.

LOUISVILLE, KY., November 21, 1889.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Having been several years in an architect's office in this city, and finding I am more capable of attending to "outside work" than "office work," and having decided to make a study of outside work, supervising, etc., I write you for information as to the best books on this subject. Hoping you will favor me by letter and oblige. Respectfully yours, JOHN H. THOMAS.

[CLARK'S "*Building Superintendence*"; Kidder's "*Architect's and Builder's Pocket-book*"; "*Notes on Building Construction*" published by Rivington, London, will be found of as much service as any English books. — EDS. AMERICAN ARCHITECT.]

"SAFE BUILDING."

DUBUQUE, IOWA, November 26, 1889.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — I have a book by the name of "*Safe Building*," and I believe at the time I ordered it, I was told that it was the first of a

series. Can you tell me if part second will be published in book-form this winter. Yours, G. F. Guilbert.

[The second volume of "*Safe Building*" cannot be published until after these papers have been completed in this journal and it is not now possible to state when this will be. — Eds. American Architect.]

REPORTERS' "FIREPROOF BUILDINGS."

Buffalo, N. Y., November 29, 1889.

To the Editors of the American Architect:

Dear Sirs, — I hope that you will make some editorial comment on the construction of the principal buildings destroyed in yesterday's fire in Boston, and their action during the fire. A great deal of damage is done to the cause of good building in this city, and, I presume, elsewhere, by accounts of such fires as this under newspaper-headings such as these, which appeared in this morning's papers: "Fireproof Buildings Melt like Wax in the Flames"; "Like Tinder"; "Splendid Fireproof Granite Structures Swept Away with Neatness and Despatch"; "Buildings apparently Fireproof as the Alps Completely Gutted"; "Modern 'fireproof' buildings, like the Ames Building at Bedford and Kingston Streets, built after the most approved fire-resisting plans, were licked up with a rush and a roar at the same appalling speed as the wooden shoe-factories at Lynn," etc.

Now, my recollection of the buildings burned is that no one of them ever pretended to be fireproof; that the best of them only had the so-called slow-burning construction. But business men will quote to-day's newspaper accounts to prove the futility of erecting fireproof structures, since they will burn as quickly as wooden buildings, and will say that it is impossible to build a really fireproof building.

I would like very much to see some account of the action of the "slow-burning" buildings under the fire; what effect they may have had in checking its spread, and whether there were any really fireproof buildings in the way of the fire which helped to stop it.

I regret exceedingly to hear of the destruction of the magnificent Ames Building, which was one of Mr. Richardson's most beautiful works, and only hope that it may be restored.

Yours truly, H. C. Burdett.

[As will be seen in our editorial columns, there were no fireproof buildings within the burnt territory, but it is true that "slow-burning" construction, in the Ames Building, failed to do all that was expected of it. However, it must be remembered that the timbers and planks in the Ames Building, although thick, were, in great part, oiled or varnished, that it opened by very large, unprotected windows on two narrow streets, and that the neighboring Brown-Durrell building, in which the fire started, was filled not only with goods, but light board partitions, which helped to produce a combustion like that of a blast-furnace, which nothing but iron and clay could resist. — Eds. American Architect.]

NOTES & CLIPPINGS

Why Wires are Deadly. — The following letter shows the results of recent experiments made by the Board of Health in regard to the safety of electric wires:

Health Department of the City of New York, October 15, 1889.

To the Sanitary Superintendent:

We visited the plant of the Manhattan Electric Light Company, at Eightieth Street and Avenue B on the 14th inst., and inspected the dynamos in operation thereat, testing the leakage of electric current from each. This station has but recently been completed, and we are informed that most of its wire is new. The following is the detailed result of our investigation:

No. of test.	Character of Dynamos.	Volts — leakage.	
		1st side.	2d side.
1	Continuous Current, Jenney	900	1,650
2	Continuous Current, Jenney (not running)	None.	None.
3	Continuous Current, Jenney	None.	1,020
4	Continuous Current, Brush	None.	None.
5	Thomson-Houston, No. 1	300	150
6	Thomson-Houston, No. 2	None.	60
7	Thomson-Houston, No. 3	None.	30
8	Alternating Current, No. 1	450	600
9	Alternating Current, No. 2 (not running)		
10	Alternating Current, No. 3	150	150
11	Alternating Current, No. 4	450	450
12	Alternating Current, No. 5	600	450
13	Alternating Current, No. 6	600	600
14	Alternating Current, No. 7	450	450
15	Alternating Current, No. 8	450	300
16	Alternating Current, No. 9	600	600
17	Alternating Current, No. 10	300	450

The Cardew patent voltmeter was used for this purpose, one terminal being grounded. The instrument contained three resistance coils in series with it, so that the voltage could be read from 30 to 3,000 volts. The coils were wound so as to cancel the effect of self-induction, and the apparatus has recently been tested by two authorities and found correct within one volt. A third calibration test is now being made.

This leakage indicates imperfect insulation. A person touching a wire leaking at a defective point would, if a ground connection were made at the same time, receive the amount of leakage indicated in our table. It is our opinion, based upon our own experiments, and authentic records of the experiments of others, that an alternating current of 250 volts is dangerous to the life of any person through whose body such current might pass; also that a continuous current of 700 volts is, in a like manner, an unsafe amount of electrical force to be permitted to be used upon an imperfectly insulated wire.

We therefore respectfully recommend that proper measures be taken to reduce the electrical pressure upon wires used in the city of New York to less than what we have indicated as unsafe.

(Signed) Cyrus Edson, M.D.,
Chief Inspector.
Edward W. Martin.,
Chemist.

It is understood that the amount of electricity on the wires at the time of the experiment was 2,500 volts. — *N. Y. Evening Post.*

The Earliest Electric Lamp. — The first electric light in a dwelling-house in the world is said to have been used in Salem, Mass., in a parlor which was lighted every evening during the month of July, 1859, by the electric light, and it was subdivided, two lamps being used, either of which could be lighted by turning a little button to the right. The current, says *Light and Heat*, was taken from a galvanic battery of about three dozen six-gallon jars. The electrical genius who thus accomplished so much was Mr. Moses G. Farmer, an eminent electrician, who is still alive, though in feeble health, at Elliot, Me.

TRADE SURVEYS

As a favorable trade indication, reference may be made just at present to the reports from a number of builders in the larger cities of the country. In nearly all of them preparations are being made for a large amount of building next year, consisting of dwellings, shops, manufacturing establishments and general construction work. The reports of this year's operations, so far as received, show that the year has been better than last year, and that builders have not over-reached themselves. A good many doubts have been expressed in building circles relative to house-construction, and the opinion has been entertained in many quarters that it has been overdone. But the reports show that this opinion is an erroneous one, and that there are more buyers and renters of houses awaiting homes than ever before. This is particularly true in New York, Philadelphia, Chicago and St. Louis, but also applies to dozens of smaller cities throughout the country. In New York, a large amount of house-building is projected for next year on Long Island and at many points within easy reach of transit facilities. In Philadelphia, preparations have already been made for building two thousand houses next year. In Pittsburgh, building will be actively prosecuted, and in several smaller towns and cities in that locality a great deal of work is projected. Chicago and St. Louis builders have been greatly encouraged; all the properties erected have either been rented or sold already, or are now in process of passing out of first hands. The wage-workers in all sections of the country are better employed and better paid than ever before, and it is probable that the demand for labor will be greater in 1890 than it has been this year. The better conditions abroad will probably restrict emigration, and the urgent demand for machinery, equipments and supplies of all kinds will call for all the skilled labor available. Latest advices concerning the intentions of the labor leaders show that the Federation of Labor will probably make a more or less vigorous effort to inaugurate a strike "all along the line," as one of the leaders terms it, but there are no strong probabilities of such a strike being successful. The vast majority of American workingmen prefer to abide by the law of competition to fix wages and hours of labor. There is a decided growth of conservative feeling among the rank and file. Another very favorable indication is the projection of new manufacturing schemes, which are not confined to any one section of the country. The extraordinary activity in the South causes Northern capitalists and investors to take more interest than ever in Southern enterprises. The success of the iron-makers of the South, especially, has induced many others to follow in their footsteps. Several new steel works have been projected within two months.

Northern lumber manufacturers are interesting themselves largely in the development of new timber territory; one authority states that within ninety days 200 saw-mills have been projected. Another authority has undertaken to give an estimate of the foundries projected, only to find the number to far exceed any reasonable probability. There is urgent need of more foundries, saw-mills and small shops in the Southern States; the same is true, in a great degree, of the States west of the Mississippi; but bad crops for several seasons have somewhat retarded industrial development in that region. Another favorable indication of re[illegible] origin, is the projection of a great deal of railroad-building in short lin[illegible] in both the South and West. Stock-brokers are endeavoring to create doubt as to the permanency of present commercial conditions; but a careful review of the whole situation will not substantiate their opinions. The country — financially and commercially — was never on a more solid basis. The reports of the commercial agencies show a slight increase in the number of failures; but these failures simply mean the clearing away of stumbling blocks. New York and Boston bankers know and say that the solvency of the business interests was never more perfect. While the supply of money is not what it ought to be, or could be, under a more enlightened financial policy, there are no grounds whatever for the insinuations and assertions that the business interests are threatened with serious evils, either from within or without. Business men can safely venture upon new enterprises; manufacturers can safely push forward extensions and increase facilities with the firm assurance that their full product will be called for by the opening of the coming season. Small shopmen in the New England and Middle States have been doing remarkably well. The lumber interests of the Northwest are endeavoring to accumulate large stocks for the assured heavy demand next year. Hardware manufacturers and dealers have not been as busy for several years. It would be difficult to pick out a single industry wherein there is any well-defined weakness. The extension of capacity will probably be continued until the danger line is reached. A comparison of the prices now ruling, with those ruling twelve months ago, shows, after all, that no very great advance has been made; this is an encouraging and important fact. Speculative tendencies are threatened in many directions, but the inherent forces at work in the industries will protect consumers against any dangerous advance. It is this point which the pioneers in new work are watching most carefully. A large amount of railroad and general construction work will be projected and arranged for during this month; so far nothing has transpired to check the inauguration of new enterprises, at least, so far as cost of material or labor is concerned. Should there be any decided advance in either, it is safe to say that manufacturers, large and small, will book three to four months' business for winter and spring execution within the coming four to six weeks.

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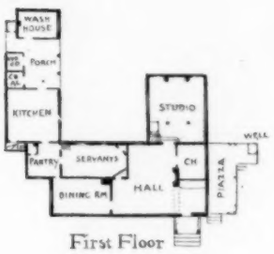

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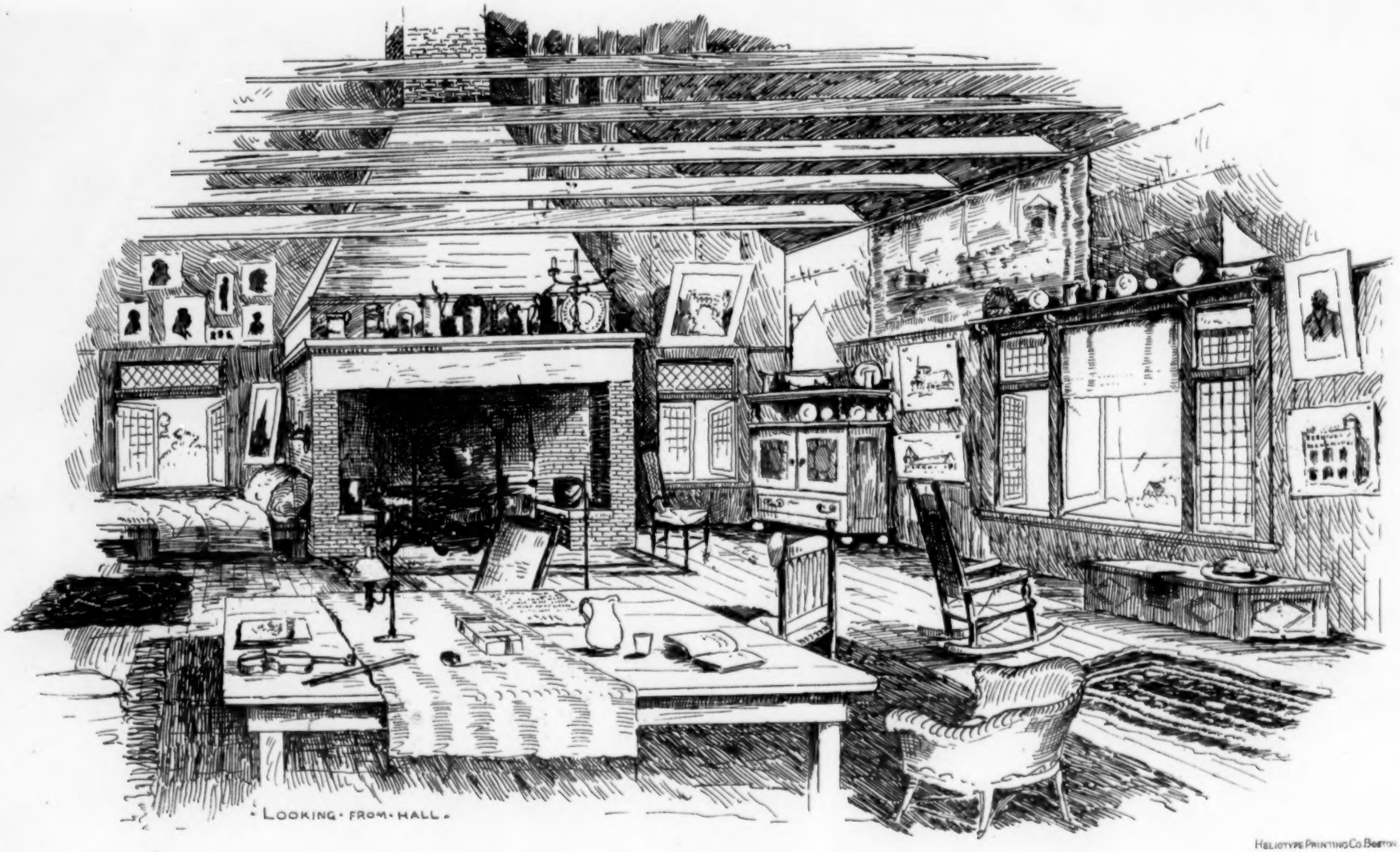

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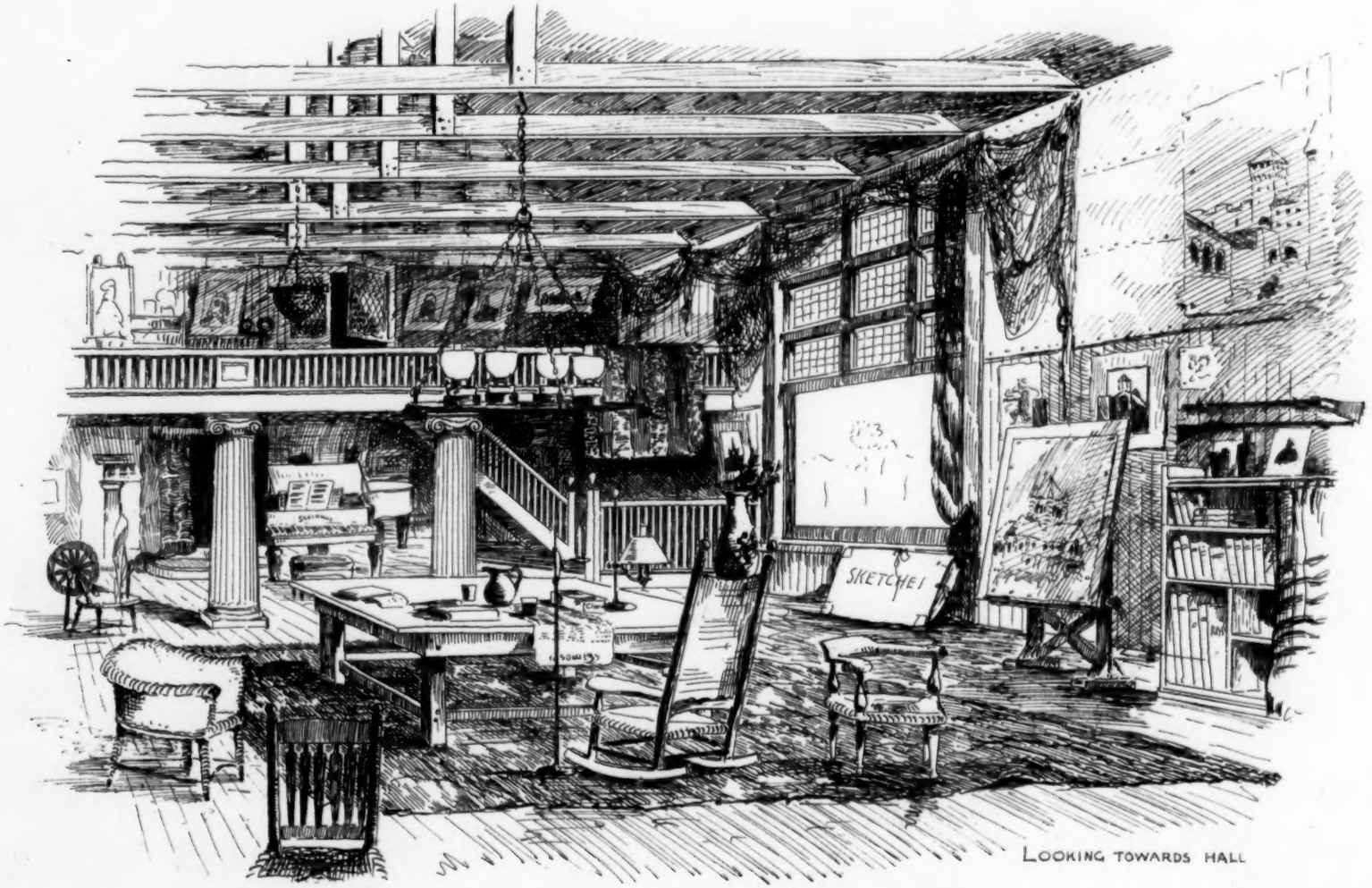

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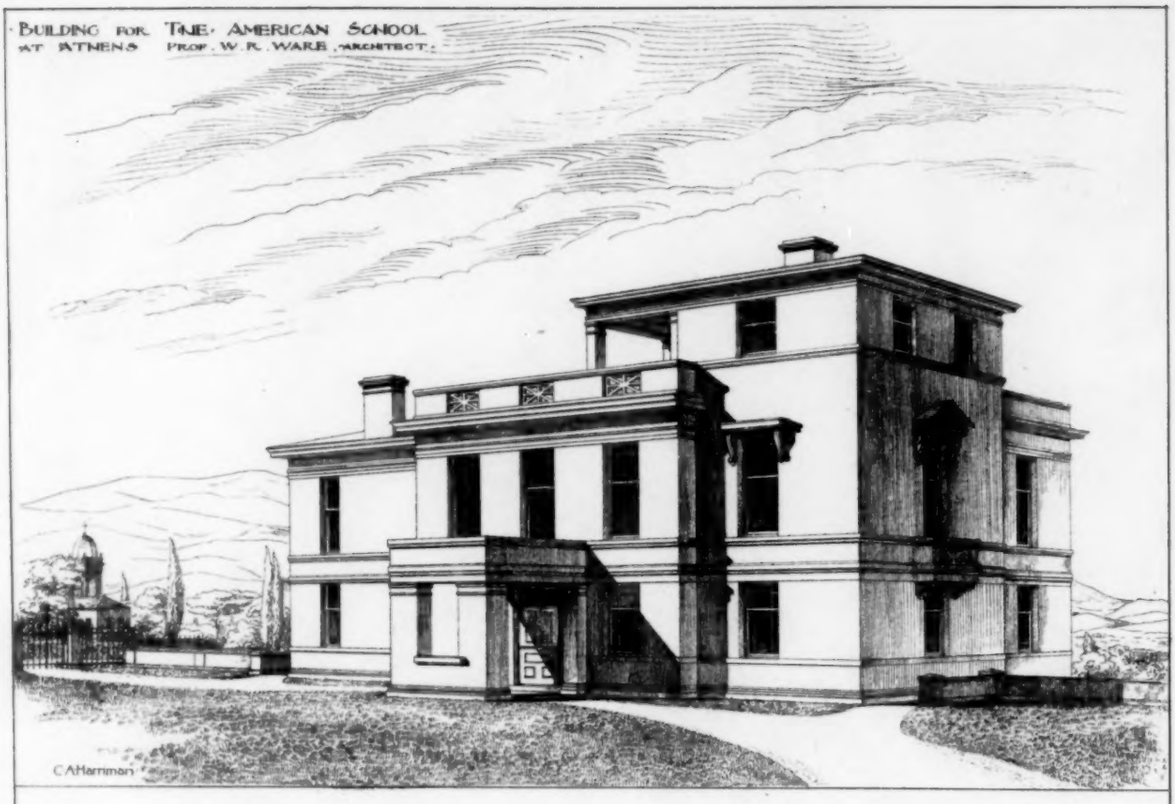

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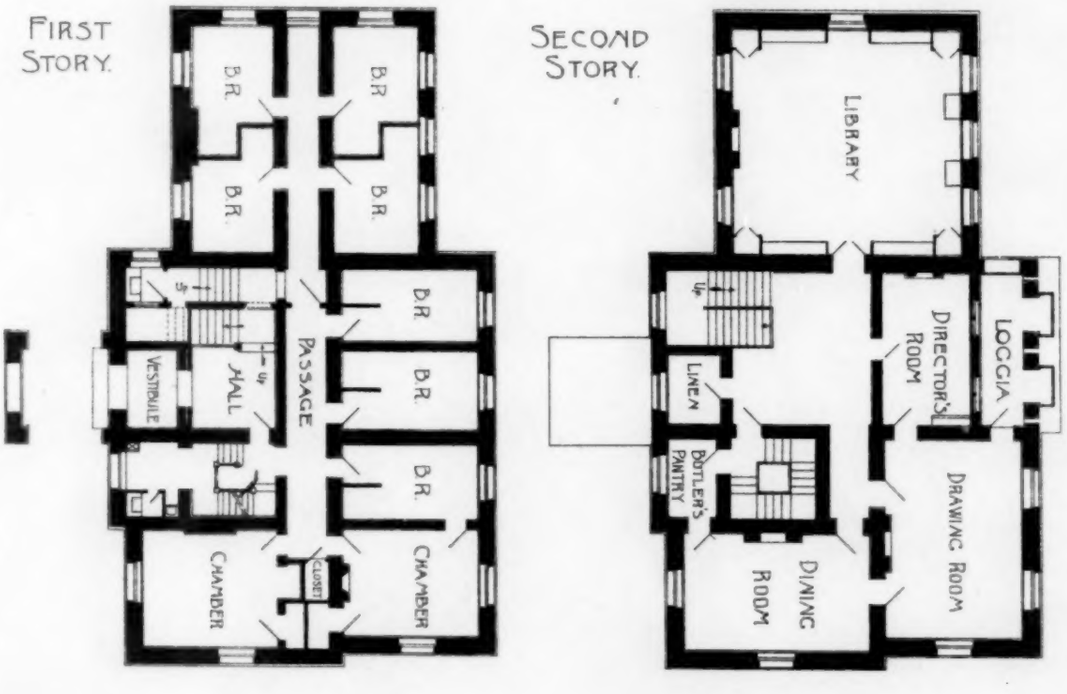

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